THE IRON TRADE REVIEW

VOLUME XXIX. CLEVELAND, O. JUNE 4, 1896 CHICAGO, ILL. NUMBER 23.

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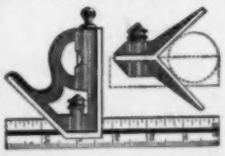

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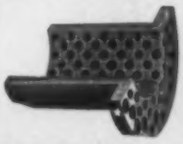

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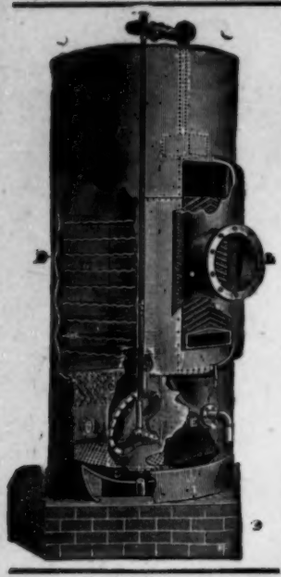

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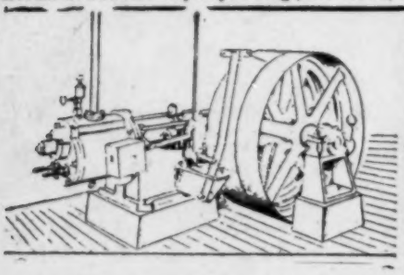

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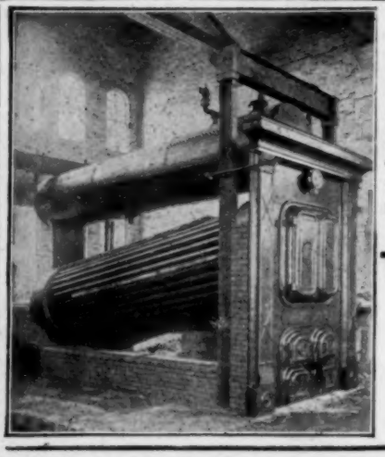

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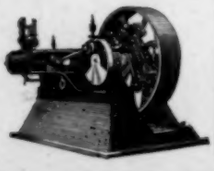

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THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Concessions by the railroads to enable furnaces to keep in operation; further additions to the list of the idle stacks; the beginning of ore buying by the leading Pittsburg interest—beyond these developments, the week has been like those that preceded it. With a 20-cent reduction in freight on coke and 5 cents on ore, valley furnaces have a small offset to the advance in ore. There is nothing especially encouraging in taking from one industry to help out another, but this move of the railroads is primarily one of self-interest, calculated to avert the greater loss that would attend a more general banking of furnaces. Yet the more important reduction for which the furnaces have been looking, and which the Central Traffic Association recommended—namely a 40-cent concession on pig iron from the valleys and Pittsburg to New York and Chicago—has been refused by the traffic association managers, according to advices just received from the East. Whether this will result in a decision by Southern roads to withold the 40-cent reduction which Southern furnaces have been looking for on pig iron shipments north of the Ohio river, remains to be seen. So far as actual business in pig iron or finished material is concerned, the week has gone without incident. Foundry buying has shrunk to the 1894 basis; but the fact that with few exceptions very little iron is carried in foundry yards means a rush of business for the furnaces when the buying movement starts. The mid-year point is the pivot of calculations in several lines, particularly with the billet pool and the sheet, bar iron and tin plate mills. Billets, like Bessemer pig, have no immediate interest for buyers. The holdings outside the pool are very small now, but purchases for the third quarter of the year hang on the wage settlements that are just now engrossing consumers of billets and sheet and tin plate bars. With business held back as it has been, and railroad requisions reduced to narrow limits, there is no likelihood of an immediate settlement of the wage scale. The annual shut-downs on July 1 will take place, and some scattered buying to assort stocks is looked for in the present month. There is no quotable change in prices, which are fairly steady in all lines. Where agreements exist, they are rigidly maintained, sellers as a rule finding little temptation to do anything else. Some Southern producers of pig iron outside the triangular agreement are said to be offering iron in stock at cash prices from 25 to 50 cents below those established. It is expected that a number of furnaces in the South, including some belonging to the largest producers, will be banked if there is not an early change in the market.

THE CLEVELAND DISTRICT.

The beginning of ore purchases by the chief consumer in the Pittsburg district is the important event of the week in iron ore circles. The business closed in the past day or two is said to include considerable amounts of Chandler and Minnesota ores, the price of the former being $4.25 and the latter $4.55. The probabilities are that additional round-lot buying will follow, though no authentic report can be made on this point. The Carnegie purchases have been expected to give new stimulus to the ore market and to be followed by a run of inquiry from furnacemen. If this proves to be the case, the next few weeks may make notable additions to the total of 4,000,000 tons of ore sold before this week's purchases. There has been some business on non-Bessemer ores in the week, but in no large way. The prices heretofore named still prevail—$2.55 to $2.70 for old range hematites, and $2.35 to $2.50 for Mesabi non-Bessemers. The freight market has been somewhat firmer in the last few days, in view of a better grain movement, but quotations on wild charters have not changed from 95c., head of the lake; 80c., Marquette, and 55c. Escanaba.

Pig Iron. Valley furnaces are not to have the expected relief through a reduction of the pig iron rate on shipments east and west. On iron to New York and Chicago, the reduction recommended by the members of the Central Traffic Association was 40 cents, but the Traffic Association managers at an Eastern meeting refused to make the recommendation effective. Meantime Northern producers of iron are threatened with the keener competition that will come if Southern pig iron freights are reduced as has been talked of lately. The lower freights on ore and coke are effective next Monday. On coke, the reduction is 25 cents to Cleveland, and 20 cents to the valley; on ore, 10 cents or from $1.15 to $1.05 to Pittsburg, and 5 cents, or to 62½ cents, to the valleys. Few sales of pig iron have been made in the past week, and quotations are nominal. Business with foundries is of the smallest proportions, but carload shipments keep up. Quotations as follows for Cleveland: Bessemer, $12.50 to $12.75; No. 1 foundry, $12.50 to $12.75; No. 2, $11.75 to $12,25; gray forge (valley), $10.25 to $10.50. Lake Superior charcoal furnacemen had a meeting recently, and made some adjustments in the delivered prices of charcoal iron. We still quote $13.50 Cleveland.

Finished Material. Projected buildings, one of them a large business block, are of interest to the trade in structural steel, and some out-of-town work is being figured on locally. In other directions the market is listless, though something is expected in merchant iron and steel this month, from buyers who need to sort up in anticipation of the July shut-down. A further conference between the labor committee of Western iron manufacturers and the Amalgamated Association conferees will be held at Youngstown this month. Meanwhile both sides are firm in their position. Business in bar iron is light. In general, railroad requirements are meager. Locally interesting is the order for 500 box cars under discussion by the Wheeling & Lake Erie. The inquiry for vessel material noted last week gives no promise of materializing at any early day. We quote 1.20c for bar iron; 1.25c for steel bars; 1.64c for beams and channels; 1.34c for angles; 1.40c to 1.45c for tank steel. Old material is very dull. We quote old iron rails, $16; old steel rails, $12.50; No. 1 wrought scrap, $12.50.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1142 MONADNOCK BLOCK, June 3.

Trade was no more active last week than the week before, and in some branches it was a good deal quieter. There seems little likelihood of any increase in business for several weeks, and opinion is about equally divided as to whether June will see any better demand than now appears. In pig iron last week almost no business was done, and the few orders taken were for small lots. The Illinois Central road is in the market for 800 cars, contract for which will be let some time this week, and the bars for these will probably be given out in the near future. Rails, billets and rods are all quiet and only small sales were made last week. Two fairly good contracts for structural material were placed, but there does not appear to be much more business in sight. In sheets and plates trade was small, and the inquiry does not indicate any expansion for the near future.

PIG IRON.—Neither Northern or Southern furnaces report any very extensive business closed last week, and the inquiry received is not very encouraging for the future. One buyer is reported to be in the market for 5,000 tons of pig iron, but he does not seem to be in any hurry to place his order. Prices of Southern iron are unchanged and well maintained by furnaces. Quotations on Northern irons are as reported last week, but some orders have been taken at prices 25c a ton under the figures we give. The Iroquois furnace is reported nearly ready to blow in, and is expected to start up about June 15. There are rumors current of reductions to take place soon in freight rates from valley furnaces to the Chicago district, but so far nothing official has been announced. Prices are made as follows:

Lake Sup. Charcoal	$13 50@14 00	Southern No. 2 Soft	$11 35@11 60
Local Coke Fdy. No. 1	12 00@12 50	South'n Silveries No. 1	11 85@12 35
Local Coke Fdy. No. 2	11 50@12 00	South'n Silveries No. 2	11 60@11 85
Local Coke Fdy. No. 3	11 00@11 50	Jackson Co. Silveries	14 50@16 00
Local Scotch Fdy. No. 1	12 00@12 50	Ohio Silveries No. 1	15 00@15 50
Local Scotch Fdy. No. 2	11 50@12 00	Ohio Silveries No. 2	14 50@15 00
Local Scotch Fdy. No. 3	11 00@11 50	Ohio Strong Softeners	15 00@15 50
South'n Coke No. 1	12 10@12 35	Alabama Car Wheel	16 85@17 35
South'n Coke No. 2	11 60@11 85	Malleable Bessemer	13 00@13 50
South'n Coke No. 3	11 10@11 60	Coke Bessemer	13 00@13 50
Southern No. 1 Soft	11 60@11 85		

BARS.—Aside from the bars required for the 800 cars which the Illinois Central Road will order this week, there is almost no demand. General business has been very quiet, and is not expected to be better immediately. Prices are firm, however, as follows: Common iron, 1.30c to 1.35c; guaranteed, 1.35c to 1.40c; soft steel bars from strictly billet stock, 1.30c to 1.35c.

RAILS AND TRACK SUPPLIES.—Small orders are still the rule, but a fair number are being received all the time, and the local mills manage to keep busy. Quotations are unchanged as follows: Rails, $29; splice bars, 1.45c to 1.50c; track bolts with square nuts, 2.05c to 2.15c; hexagon nuts, 2.15c to 2.25c; spikes, 1.75c to 1.80c.

BILLETS AND RODS.—The local steel company has done very little business in either billets or rods. Quotations are still $21.25 for billets while no prices are made on rods.

STRUCTURAL MATERIAL.—The Chicago University is to erect another building which will take about 600 tons of material, and the contract for this was let the early part of the week. Another building requiring 400 tons was contracted for in the week. No other business of importance was closed or is in sight. Quotations are made as follows: Beams and channels, 1.75c to 1.80c; angles, 1.45c to 1.50c; plates, 1.50c to 1.55c; tees, 1.65c to 1.70c. Small lots from stock are quoted ¼c to ½c higher.

PLATES.—The market is very quiet, and no transactions of importance have taken place. The only orders given out were for small lots. Prices are as last reported: Tank steel, 1.50c to 1.55c; flange steel, 1.70c to 1.75c; fire-box steel 2.35c to 5c; boiler tubes, 70 to 75 per cent discount.

SHEETS.—Sales of both black or galvanized sheets for delivery immediately were small, and the business done is for deliveries extending some time into the future. Quotations are unchanged at 2.30c to 2.35c for No. 27 black sheets, and 75 and 10 and 5 per cent discount for galvanized.

MERCHANT STEEL.—Business was only fair last week, and is not expected to improve right away. Some buying was done by implement manufacturers, but no large transactions of this character were closed. Quotations are made as follows: Open-hearth spring, tire and machinery steel, 1.85c to 1.95c; smooth finished machinery steel, 1.60c to 1.65c; smooth finished tire 1.55c to 1.65c; tool steel, 5 50c to 7.50c; specials, 11c and upwards.

OLD RAILS AND WHEELS.—A few small sales were made of old wheels, but they were hardly large enough to make a quotation. Other classes of old material were in light demand, and sales were exceedingly small. Prices are nominally as follows: Old wheels, $13.00 to $13.50; old iron rails, $14.50 to $15; old steel rails, $10.00 to $11.00.

SCRAP.—Demand is still small, and sales last week were light. Dealers do not look for any improvement in the near future. The following are buying quotations furnished by dealers: Railroad forge, $11.50 to $12; dealers' forge, $10 to $10.50; No. 1 mill, $8; heavy cast, gross ton, $9 to $9.50; malleable cast, $9.50 to $10; axles, $15; cast borings, $4.25; wrought turnings, $5.25; axle turnings, $6.50; mixed steel, $7.75; stove plates, $7; heavy melting steel, $9 to $9.50.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
807 TRADESMEN'S BUILDING, June 3.

It is understood that some of the ore requirements of the leading interest have been covered in the past week, the purchases including round lots of Vermilion range hard Bessemer and hematite. Otherwise the principal event of the week is the annual meeting of the Tin Plate Manufacturers' Association, which began at its headquarters in the Conestoga Bldg., Wednesday morning, with a large attendance. The report of the committee to secure data on foreign and domestic prices of tin plate was considered at length. It is expected that the conference on tin plate workers' wages will be held next week and that on the sheet mill scale in the week following. There has been little business in Bessemer pig or billets in the week. Later information than that given below concerning billets is that sales of 1,000 and 2,000 tons have been made, deliveries after July 1, at $20.25. The rod market is at a standstill, pending action by the nail pool meeting at New York. The supply of nails is reported low, and if prices are reduced a considerable volume of business is looked for. An Eastern inquiry on 12,000 tons of plates has come up, but it is said that the order will not be placed at once.

PIG IRON.—There are no signs of improvement and no effort is made to push matters. The week has witnessed no weakening in prices but there is an almost entire absence of transactions. Foundry iron has been the most active and sales of 200 and 300 tons have been made. Gray forge has been in light demand and has sold for a trifle lower. Bessemer has not moved, and prices in the absence of sales, nominally remain as last week. The

effect of the banking of valley furnaces will naturally be favorable, but in the present state of demand at the finished end of the market may be some time in making an impression. We quote as follows:

Bessemer.....	$12.50 and $12.65	No. 2 Foundry.....	$11.75 and $12.00
No. 1 Foundry...	12.50 " 12.75	Gray Forge.....	10.75 " 10.85

BILLETS AND RODS.—Billets, when sold, bring about the prices previously quoted. One sale of 1,000 tons is reported at $19.25, and another of the same size at $19.75. No sales at pool rates are announced. Very little steel is offered and there is no inquiry. On sheet bars the quotation is $22.25. We note a sale of 500 tons at $22. Rods are held at $26 but the price is not established by sales.

STRUCTURAL MATERIAL.—The agreed upon advance on beams and channels has had no apparent effect on demand; perhaps the supply of orders is rather better than in other lines. Several Eastern orders of considerable size have come to local mills and inquiry is somewhat improved. The new union depot at Columbus has come through Chicago contractors to a local mill. It calls for about 1,600 tons. Beams and channels are held at 1.55c; angles, 1.25c and 1.30c; tees, 1.45c; universal plates, 1.35c.

PLATES.—The volume of business in plates is heavier than in any other line. The 25 locomotives ordered for the Lehigh Valley Road, as well as those of the B. & O., also reported last week, have brought plate orders to local mills. Business in the Wheeling district and at Erie is reported as much heavier than for some time past and orders are consequently heavier. We quote tank plate 1.30c and 1.35c; shell, 1.40c and 1.45c; flange, 1.50c and 1.55c.

SHEETS.—Local mills are running only about three-fourths time and have no trouble in filling orders at this rate. Prices remain: No. 26, 2c and 2.05c; No. 27, 2.10c and 2.15c; No. 28, 2.20c and 2.25c.

OLD MATERIAL.—The market is lifeless. Nominal prices follow: Old steel rails, $12.50 and $13; old iron rails, $16; cast scrap, $10; wrought scrap, $12; rolled iron axles, $17; hammered iron axles, $15; coil spring, $13; car wheels, $11 and $11.50.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Cincinnati. The market has been saved from absolute death during the past week by a few transactions ranging from 50 to 3,000 tons. No revival in interest is shown, and but little is expected in the way of new business until July. Consumers with light stocks are hurrying forward iron for immediate use, while others are requesting suspension of shipments to reduce accumnlations in their yards pending July 1st inventory. Birmingham furnaces generally are holding prices firm. There is about the usual movement of small lots of special brands of high silicon and charcoal irons.

Philadelphia. Meetings of iron manufacturers are being held from time to time, but no new developments are reported. The Eastern Bar Iron Association has met recently, but left prices unchanged. Some effort is being made by furnaces to get a better understanding, but while it is agreed that all must have more money for their iron, no united action is taken. The market is in a condition in which it seems plain that to advanced prices would be of little help to those who have practically no orders, and to lower them would be just as little of a stimulus. A reduction of output is one remedy, but a pro rata reduction is very difficult of achievement. We quote No. 1 X foundry iron at $12.50 to $13; No. 2 X at $12 to $12.25; standard mill irons at $11 to $11.25; ordinary at $10.75. Business in finished material is getting to be very dull, particularly in bars and plates. In view of the probability of a shut down in the early part of July, a fair run of small orders is looked for in June. Quotations are made: Refined bars, 1.20c to 1.30c on mill shipments, or 1.40c to 1.45c from store; tank plates, 1.40c to 1.50c; angles, 1.40c; beams and channels, 1.70c to 1.80c.

Buffalo. There is no material change to note in the situation. The consumption of foundry iron keeps up and the feeling grows stronger among founders that they will continue to receive at least as much business during the summer as they have had for some months past. Charcoal iron is, if anything, a trifle firmer, as more of the furnaces in the Lake Superior district work up ore purchased on the old basis. Some good sized sales of local coke irons have been made during the past week, but on the whole, sales have been confined to small amounts for quick shipment.

LAKE SUPERIOR IRON MINES.

The Buffalo, the pioneer mine of the East Range and one of the Queen syndicate which has been idle for the past two years, will be started up and likely give employment to about 150 men, which will swell the total number employed by the Queen company to nearly 700. The company has made some sales of ore at $2.55 delivered in Cleveland, from which it will be seen that the margin of profit on the present wage scale will necessarily be small.—[Iron Herald, Negaunee, Mich.

The Star-west mine on the Cascade range, that made fair shipments of high silica ore last year, is likely to curtail its force if its product does not move soon.

J. F. Armstrong, who has had charge of the Canton mine until recently, has accepted the position of general manager of the Sellers mine at Hibbing, Minn.

At the Pence mine on the Gogebic range, a body of ore 74 feet wide and 98 feet long has been uncovered. A new air compressor, a Prescott pump and a new boiler are to be put in position.

The shut-down at the Norrie, East Norrie and Pabst mines was temporary and work was resumed at the beginning of this week with 900 to 1,000 men, the force having been curtailed somewhat. The ore blockade at Ashland and the necessity of putting ore on the dock at Lake Erie ports led to the brief shut-down.

At the Traders property, of the Antoine Ore Co., near Iron Mountain, Mich., work is being actively pushed in the Clifford pit. A Gates rock crusher of 3,000 tons daily capacity is at work. The pit can be sunk 100 feet deeper before underground mining will begin.

The Jackson Iron Co. is stripping the ore deposit recently found on the hill near its Sand shaft. Several test pits have been put down and ore has been found in six or seven of them covering an area of over 100 feet square. The test pitting is still going on, the management desiring to ascertain the length and width of the deposit if possible. The average depth of the ore from surface is between 10 and 13 feet.

IN discussing the subject of tin roofs a Welsh newspaper brings to public notice the singular fact that, while Great Britain for years made this material for the world, the tin roof is entirely unknown in England. The Welsh know next to nothing about methods of putting on a tin roof, and those interested in introducing the use of Welsh tin plates for roofing English homes have in contemplation the importation of an American tinner to introduce American methods of using these plates.—[Bulletin.

THE American Pig Iron Storage Warrant Co. had in its yard May 3, 109,800 tons of pig iron, 500 tons having been put in yard and 200 tons withdrawn in the preceding 11 days.

THE IRON TRADE REVIEW

DEVOTED TO IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES.

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ENTERED AT THE POST OFFICE IN CLEVELAND, O., AS SECOND CLASS MATTER

JUNE 4, 1896.

LOWER quotations for Bessemer and gray forge, with stoppage of two-thirds of the furnaces in Virginia, some in Pennsylvania, and others in the Mahoning and Shenango valleys, result from inability of manufacturers to sell at prices which their combinations demand.

The inference from the above, found in a commercial agency's review of last Saturday, is that if prices of manufactured iron and steel were lowered, there would be increased consumption, pig iron would be in better demand and furnaces would not have to stop. This is a mistaken view. It is well understood on both sides of the market that lower prices would not stimulate buying in iron and steel. The wait is not that buyers may make sure that the combinations will hold prices, but to see whether business will broaden and capital go forward with enterprises that have been projected. It is not a question of $2 or $4 a ton on structural material that holds back certain building projects, for example, but rather the desire to be assured that larger facilities for business will be justified, and that money loaned for such enterprises will bring a fair return in 100-cent dollars. Iron and steel manufacturers have been discreet enough to provide against the double misfortune of small business and no margin on the little done. That is the proper way to look at the majority of the existing agreements on prices.

ROLLED PRODUCTS IN CERTAIN DISTRICTS.

Some of the most interesting figures contained in the annual statistical report of the American Iron and Steel Association, relate to the production of the various forms of rolled iron and steel and its distribution among the important producing districts. The total of all forms of rolled iron and steel, including cut nails, in 1895, was 6,189,574 gross tons. Of this amount Pennsylvania and Ohio together produced 4,385,600 tons, or over 70 per cent, Pennsylvania's total being nearly four times that of Ohio. The production in the different districts in these two States, in the past four years is an attractive study, for the indications it gives of the ebb and flow of rolling mill and steel works operations in the years of depression and in the boom that followed, last year. The table indicating the production of all forms of rolled iron and steel in Pennsylvania districts in 1892, 1893, 1894 and 1895 is as follows, gross tons being used:

	1892.	1893.	1894.	1895.
Philadelphia	102,411	96,950	80,345	114,759
Eastern Pennsylvania	576,111	415,277	335,993	406,919
Central Pennsylvania	687,005	656,892	567,052	671,571
Allegheny County	1,437,096	1,249,564	1,350,608	1,813,216
Western Pennsylvania	499,883	444,150	385,798	485,470
Total	3,302,506	2,862,833	2,719,796	3,491,935

An examination of Mr. Swank's tables classifying the materials rolled shows that the gain of about 380,000 tons in Allegheny county is represented chiefly by an increase of nearly 285,000 tons, between 1892 and 1895, in "bars, rods, bolts, hoops, skelp, shapes and rolled axles," the greater part, presumably, being in shapes; and an increase of 100,000 tons in plates and sheets. There was a loss of 10,000 tons in rails in 1895, as compared with 1892. Eastern Pennsylvania, it will be noticed, even with the help of last year's boom, did not approach its total for 1892.

The figures for Ohio are given below in gross tons, and are likewise suggestive:

	1892.	1893.	1894.	1895.
Lake Counties	322,972	233,795	250,345	407,569
Mahoning Valley	323,908	204,896	165,336	293,926
Interior Counties	81,129	77,478	65,798	90,454
Ohio River Counties	160,784	123,715	95,601	101,716
Total	888,793	639,884	577,080	893,665

It would be useless to generalize from the figures given above, without more data; but one or two facts are worth mentioning. With the exception of a small increase on a small product in "Interior Counties," comparing 1895 with 1892, the Cleveland district, or the "Lake Counties," is alone in Ohio in showing a pronounced gain last year over its output in the good year 1892. This increase consists principally of 65,000 tons of rails in 1895 against none in 1892, and 30,000 tons increase in "bars, rods, bolts, hoops, skelp, shapes and rolled axles." A coincidence to be noticed is that the percentage of gain, 1895 over 1892, for Lake Counties is exactly the same as for Allegheny County—namely, 26 per cent.

THE West Chicago Park Board gave a contract last week for a 500 horse power Cochrane heater, an 8-inch live steam separator and a 14-inch separator complete, according to the special Cochrane vacuum system, for use on the exhaust line of condensing engine. The contract was awarded to A. Sorge, Jr., M. E., representing the Harrison Safety Boiler Works.

THE directors of the Standard Car Wheel Co., of Cleveland, incorporated recently, are the following: C. A. Brayton, president; W. L. Bowler, general manager; Wm. B. Brayton, N. P. Bowler and F. J. Wing. The new company has acquired the car wheel works of Bowler & Co., on Bessemer st., Cleveland. The capitalization is $75,000.

THE National Tin Plate Co., of Anderson, Ind., writes in general answer to inquiries about the damage to its works by the recent tornado. The only real loss to the company is in time. The damage was slight, and fully covered by insurance, and the six mills are now running as usual.

THE Hainsworth Steel Works, Pittsburg, have been undergoing repairs for two weeks past.

THE non-partisan tariff convention, in Detroit, this week, is not largely attended.

BOILER MANUFACTURERS' CONVENTION.

The eighth annual convention of the American Boiler Manufacturers' Association began its sessions at the Weddell House, Cleveland, Tuesday afternoon, June 2. The attendance was not as large as usual, but the convention was profitable in its discussions and important in its action on pending questions. Among those present were: H. S. Robinson, of Boston; F. M. Leonard, of London, Ont.; James D. Smith, of Charleston, S. C.; C. M. Tudor, of Cincinnati; J. B. Campbell, of Akron, O.; James Lappan, Col. R. Munroe, Geo. Riley and A. T. Doughett, of Pittsburg; Robert M. Bates, of Conshocken, Pa.; H. S. Russell, of Pittsfield, Mass.; C. F. McGill, of Geneva, N. Y.; E. N. Squires, of Pittsburg; Col. E. D. Meier, of St. Louis, and John Overn, H. J. Hartley and Geo. B. Hartley, of Philadelphia. Mr. H. Hartley is connected with the Cramp shipyard. The Cleveland members are D. Connelly, of the Cleveland Steam Boiler Works, and J. D. Farassey, of H. E. Teachout & Co. President Robinson, occupied the chair, and Col. Meier, as for several years, acted as secretary.

The first discussion of the session was on a brief paper by F. M. Leonard, on "Expansion of Boilers." The speaker made the following statement concerning his observations relative to expansion and the conclusions drawn therefrom:

"During the last year an opportunity was offered to measure carefully the expansion of a stationary boiler bricked in, and a small locomotive boiler mounted on skids, and it would appear that the expansion amounts to very little. The stationary boiler was 60″ diameter, 12′ long, stood three days, being cleaned and washed out, and on the fourth day was steamed up to the working pressure of 90 lbs. A difference of only ¼″ could be seen in the length when standing cooled off and steam on. The locomotive boiler was 34″ diameter, 12′ 9″ long over all, and carried 95 lbs. of steam, measuring only ¼″ less after having the water drawn off and standing 24 hours. From this it would appear that plates and rollers under the brackets are unnecessary, as ¼″ expansion in 12 feet amounts to practically nothing."

Col. Meier had made a test with a boiler 16′ long, and the expansion was 5-16″—this result being in line with the observations of Mr. Leonard. Mr. Campbell said that the only test he had made was with an upright boiler 30′ long and it had expanded 1½″ from the foundation up. This statement was received with some surprise by others, Col. Meier remarking that the expansion should not have been over 5-16″. Mr. Leonard, answering a question as to his method of determining expansion, said that he made a rod with a hook on the end of it and pushed it through the boiler tubes to the back end, measuring it both hot and cold.

Col. Munroe.—In the case of a steam pipe 60′ long and 20″ in diameter, with a steam pressure of 100 to 120 pounds, the expansion was about ¾″.

Col. Meier.—With the old style blast furnace boilers, 60 to 65 feet long, the expansion used to play strange freaks, and "hog-up" the boilers at the ends. I suggest that there is another point, and that is the hydrostatic pressure in a boiler. This will stretch it in length considerably, and the shell will stretch more than the tubes. If you will simply measure the boiler when it is ready for testing, you can easily determine this difference when there is a pressure of 200 pounds or more on it.

Col. Munroe.—Some years ago I built a boiler with an inner boiler and an outer shell. The pressure came up quick, and the inner boiler expanded so much quicker than the outer that we concluded to measure. The expansion was greater in the inner than in the outer one. The diameter of the former was 40″, and of the latter 52″.

Mr. Lappan observed that the diameter of a vessel has nothing to do with the elongation.

Topical question No. 29 on the association's list was then taken up for discussion. It was as follows: "Which is the most satisfactory way of staying stationary boilers—(1) Crow foot stays riveted to head and to shell? (2) Angle iron riveted to head and connected to shell with stay rods having eye bolts? (3) Stay rods running from head to head with washers and nuts inside and out?"

Mr. Russell referred to an experience of 20 years in which he had always braced boilers in the first way indicated in the question.

H. J. Hartley.—All methods of staying are good under certain circumstances and some boilers are braced much more than they should be. Get into an old boiler and see the crow-foot braces. You will find them broken and crowded all the way through. There is nothing better than the through staybolt. Some give good results with gussets, and again others with crow feet.

Mr. Leonard favored the crow foot stay because it gave the best distribution of rivets over the head. He thought a boiler could be sufficiently stayed in this way and still leave room for cleaning it. Mr. Lappan had found that the crow foot brace does very well where other braces cannot be used.

Angle iron had been found preferable by Col. Munroe. He had never found it torn off. He had used steel angles, too, but in nine cases out of 10 had stayed with angle iron. Mr. Campbell had tried both angle and T iron under 200 lbs. pressure and found the T iron the better. Angle iron inclined to pull away.

Geo. B. Hartley had watched reports from various parts of the country and found that so many crow foot braces were broken off completely that he had concluded that in a boiler up to 60″ in diameter a gusset brace should be used; between 60″ and 72″ boilers can be braced with an extension stay. The gusset brace obviates the necessity of cleaning, met with where the crow foot brace is used.

Topical Question No. 30 was taken up as follows: "Which is the best place to feed boilers—(1) At the bottom near the rear end? (2) In the front head below the tubes? (3) On the top with a pipe leading below the water line?" There was a variety of answers. Some admitted the feed water at the top, others through the blow off, others in the third way indicated. A Pittsburg device was described which feeds the water into the steam space in a fine spray. Col. Munroe could not agree with the view that feed water should be admitted in the front end of the bottom. "My preference from experience is to feed the water above the water line at the front end, letting it fall over the sides of a sort of flat cup, and so make the steam act as a chemical. We have less scale on our tubes by this method, and by blowing out two or three times a day have nothing but a muddy substance to expel. I prefer the top feed because it makes less scale."

Wednesday's Proceedings.

The report of the committee on uniform State inspection laws was taken up Wednesday morning. Some of the efforts to secure legislation in various States were reviewed. The recommendation of the committee was adopted, that the association use its influence to secure the passage by the States of laws embodying the regulations now enforced in the case of marine boilers, by the Board of Supervising Inspectors of Steam Vessels.

The secretary was instructed to arrange with the various mills rolling boiler plates, for the stamping of all boiler steel which conforms with the specifications of the association. The stamp will be of a copyrighted design. The report of the committee on materials, containing the above recommendation, also reaffirmed previous declarations of the association condemning the use of cast iron in all parts of boilers subject to tensile stress.

The committee on manheads recommended the Eclipse manhead and the secretary will submit the recommendation to the 60 members of the association for their action, by letter ballot.

An interesting paper was read by Superintendent Hartley, of the Cramp works, on "Modern Boiler Construction as Compared with that of Twenty Years Ago."

The topical questions discussed at Wednesday evening's sessions included the following: "What is the best plan to make temporary repairs when a crack occurs between tube holes in the head of a stationary boiler?" "What is your experience in regard to chimney and flue areas?" "What is the best method of supporting a horizontal tubular boiler?" Under the second question the relative draft-giving qualities of iron and brick chimneys, the relation between chimney area and grate space, and between chimney height and chimney area, relation of flue area and grate space, and allowance in flue area, where the flue is crooked, were all discussed.

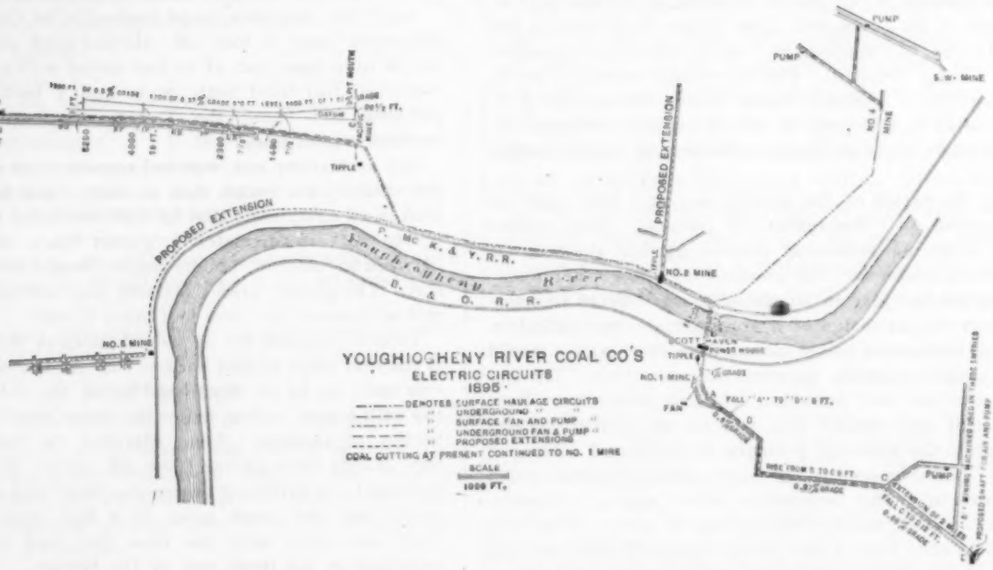
ELECTRICITY IN COAL MINING.

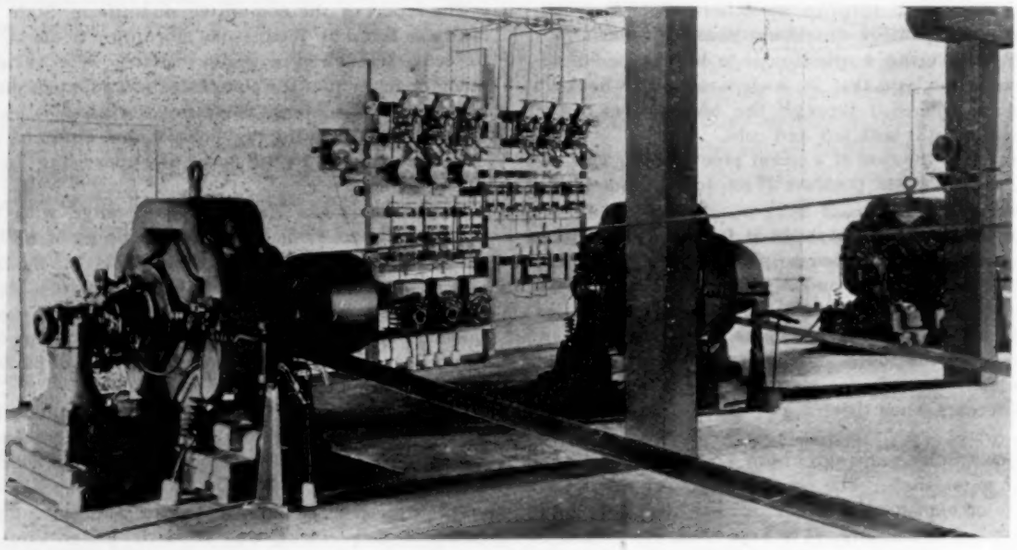
One of the most interesting electrically operated coal properties in the Pennsylvania field is that of the Youghiogheny River Coal Co., at Scott Haven, Pa. The mines in which the different machines, driven by electric power, are installed, are scattered over a large extent of territory, the annexed map showing the different openings The power house is located on the east side of the Youghiogheny river, contiguous to the line of the B. & O. R. R. It was formerly a bonded warehouse and contains not only the machinery but also the stores and offices.

In the boiler house are three 66″x18′ tubular boilers, each containing 58 four-inch tubes in diameter. Each boiler is coaled through a shute, is independent, and has its own stack. These boilers were built by the Union Iron Works, of Erie, Pa. Water is pumped by a Downie deep-well pump, from a well 130 feet deep, and that which is not immediately used is stored in tanks.

The engine room is 74 feet long by 54 feet wide, and is separated by a brick wall from the power house. The engine installation consists of three automatic engines, each 15″x16″, with 72-inch fly-wheels running at 240 revolutions. Each engine is belted to a four-pole, 650 revolution, 100 k. w. General Electric generator, wound for 500 volts and over-compounded for 10% loss in the line. The engines and dynamos are erected on brick foundations. The current from the generators is carried under the floor to the switchboard over heavily insulated cables laid on porcelain insulators.

The switchboard is of the skeleton type, divided into two parts, one for the generators and one for the feeders, on a plan similar to that used in the ordinary electric railway stations. The generator board carries three automatic circuit breakers, three circular dial Weston ammeters, three main double-pole double-throw switches and three field rheostats. The voltmeter is carried on a bracket on the side. The arrangement of the switchboard is such that the plant may be run under the most economical conditions and every precaution is taken against stoppage in its operation. Two sets of circuits are run—one of which is grounded for haulage work, and the other metallic, for the fans, coal-cutters, etc. Any machine may be run on either the metallic or the grounded circuit, and any two, or all three, may be run in multiple on either circuit. The feeder switchboard carries an automatic circuit-breaker for each of the haulage circuits, a double pole switch for each pump circuit, fan circuit, and the coal-cutter circuit; and a double-pole switch for throwing the metallic and grounded bus-bars into multiple. Lightning arresters, protecting the generators, are placed behind the switchboard. From the power house the circuits for No. 1 mine are run on poles to the mine mouth. This mine is about 900 feet from the power house, and the circuit is used to drive fans, pumps locomotives and coal-cutters. The fan is a Capell exhaus fan, 8′x3½′, running at 280 r. p. m., driven by a belted 25 h. p. multipolar moderate speed motor, running at 650 revolutions. All the coal-cutting is being done in No. 1 mine by five Jeffrey chain coal under-cutters, operated a mile and three-quarters from the power house. The circuit for the coal-cutters is a metallic circuit, the other circuits all having earth return. This mine is also provided with a Knowles triplex pump, 6½″x8″, driven by a 7½ h. p. multipolar motor. The pump, motor and rheostat are mounted on an iron truck and





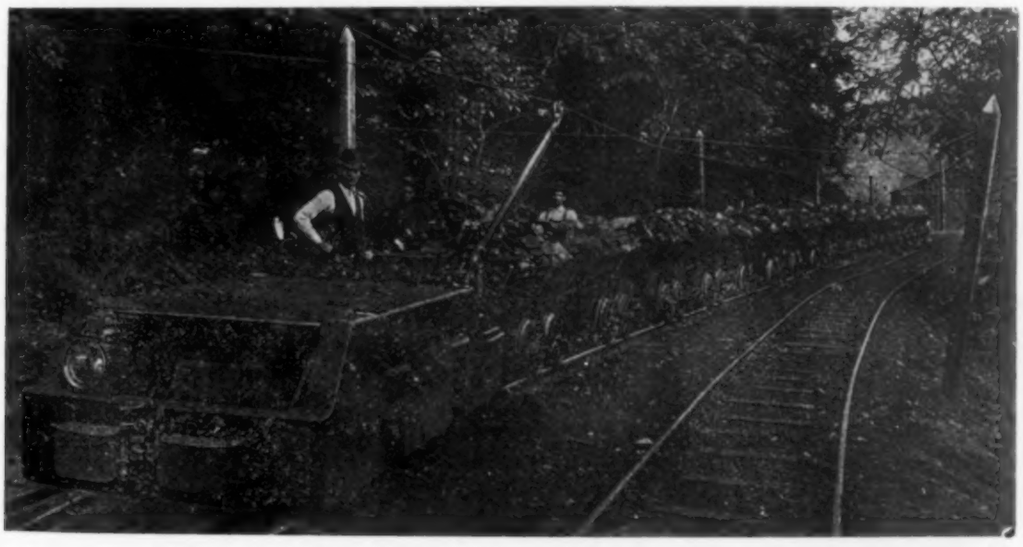
YOUGHIOGHENY IVER COAL CO.'S POWER HOUSE.

may be run over the track from place to place in the mine.

The electric locomotive operated in this mine has a length of haul a little over a mile and a quarter. The grades vary from 1% against loads to .25 per cent in their favor. The track is laid in 30-pound rails, with a gauge of 43½ inches. The overhead construction is of the regular mining type. The pump and haulage circuits are all grounded for the return.

The fact that the various mines are separated from each other by water, introduces a novel feature into the installation and illustrates the flexibility of electric power transmission. For each of the other mines in the Youghiogheny Co.'s system, current has to be carried under the Youghiogheny river, by heavy insulated and armored cables, to a small cable house forming the center of distribution for the lines running to the mines on the west side of the river.

In No. 4 and the Southwest mines, electricity is applied to pumping purposes only. The pumps are triplex pumps, similar to those in No. 1 mine, and are driven by two multipolar slow-speed motors of 10 h. p. and 7½ h. p., respectively; these pumps are about 8,000 feet away from the power house. In the Pacific mine the haulage is effected by a locomotive, having a drawbar pull of 2,500 pounds, with a length of haul of about 5,000 feet underground and 800 feet in the open. This mine also contains a pump, similar in size to that in No. 1 mine, driven by a 7½ h. p. motor, located about 16,000 feet from the power house. A 30 h. p. motor fan is erected about 1,000 feet beyond the pump. The installation of the electrical apparatus in No. 5 mine is not yet completed.



ELECTRIC HAULAGE AT YOUGHIOGHENY RIVER COAL CO.'S MINES.

In the new steel tipple of No. 1 mine a 7½ h. p. motor drives a revolving screen and runs an emery wheel for sharpening bits, etc. The installation of electricity in this mine has proved of more than considerable benefit from every point of view. A a fair idea can be obtained of the economical value of electric haulage from the statement that the two locomotives have displaced 18 mules and their drivers; and the four pumps, which take only a small share of the attention of three separate men, are doing the work with which ten men, four mules, two steam boilers, and two steam pumps had formerly found it difficult to cope.

The entire electrical apparatus used in the power house and in the mines, with the exception of the coal-cutters, is of General Electric Co's. manufacture. Within the past three years this company has done much to develop electrical apparatus for use in mining work. It has over 50 of its mining locomotives in operation in different mines in the country, as well as pumps, hoists, ventilators, coal-cutters, drills, etc., and all are working satisfactorily and economically.

Received from the Trade.

The use of mannocitin as a rust preventive has been extending rapidly in the United States in the past year. In a little booklet of opinions just issued by Otto Goetze, 114 Broad st., New York, the agent of the manufacturers, testimonials are given from the Cleveland Twist Drill Co., the Cleveland Rolling Mill Co., the Acme Machinery Co., Globe Iron Works Co. and others, in Cleveland; the Pratt & Whitney Co., Billings & Spencer Co., Hartford; Wickes Bros., East Saginaw, Mich.; Fox Machine Co., Grand Rapids, Mich.; Toledo Machine & Tool Co., Toledo, O.; Brass & Iron Works Co., Fostoria, O.; Chilled Roll Foundry, Pittsburg—all telling of the effectiveness of mannocitin in protecting bright surfaces and preserving machinery and tools from rust.

Uehling, Steinbart & Co., Ltd., of Newark, N. J., illustrate in a recent circular the special features of their pneumatic pyrometer, and accompany the description with reproductions of autographic temperature records. Letters from users are also added.

Warren, Webster & Co., Camden, N. J., in their latest occasional pamphlet, summarize the claims for the Webster vacuum system of steam heating; illustrate anew their vacuum feed-water heater and purifier, and explain in detail their thermostatic water and air relief valves.

Personal.

Charles Pettigrew, who recently resigned his position as manager of the Joliet works of the Illinois Steel Co., has accepted the position of general superintendent of the new American Steel Co., of Indianapolis, Ind. This company has lately been formed and has taken a lease of the plant of the Premier Steel Co. It is proposed to run the plant on billets and sheet and tin plate bars, which will be taken by the American Tin Plate Co., Elwood, Ind., and the American Wire Nail Co., Anderson, Ind.

H. M. Norris has resigned as superintendent of Riehle Bros. Co., and editor of the *Digest of Physical Tests*, to become general manager of the Campbell & Zell Co., Baltimore.

James T. Wood, a well known Pittsburg iron factor, died at Cambridgeboro, Pa., May 28.

Wm. Deering, the well known Chicago manufacturer of harvesting machinery has brought his gifts to the Northwestern University close to a half million by his recent contribution of $215,000 to its endowment fund.

S. T. Bleyer, general manager of the Hawley Down Draft Furnace Co., has returned from Paris. Mr. Bleyer was present at the installation of the Hawley furnace which was put in operation for competitive test by the French Government.

W. L. Getchell, who has been connected with the Chicago office of the Standard Paint Co. for some time past, has lately taken the position of Chicago representative of the Jos. Dixon Crucible Co., with office at 1315 Monadnock Block.

C. J. Milton has just been appointed agent at St. Louis and vicinity for the Sloss Iron & Steel Co., with office 219 N. Fourth st.

MABLE furnace at Sharpsville, Pa., has been making an exceptional output lately. On May 31 it made 250 tons and in the week ending May 30 the total was 1,481 tons. For a stack 65x15 this is unusually good work.

ATTACHMENT FOR GRINDING MACHINES.

An improved work-holding attachment for grinding has been brought out by Amos Hartley, of Vassar, Kan., and the design and operation of the device are shown in the three illustrations given herewith. The invention consists of a U-shaped frame adapted to be supported on the work-holding mandrel of the grinding machine and provided in the ends of its arms with means for securing in axial alignment a form or pattern and an irregular piece of work to be ground—as, for example, a grooved sheave—the pattern being in position to be engaged by a finger or projection on the tool post, and the piece of work being in position to be engaged by a grinding-wheel on the spindle of the tool rest.

In the illustrations, Fig. 1 is a side elevation showing a grinding machine with the new work-holding attachment applied thereto for use. Fig. 2 is a plan view of the machine as as shown in Fig. 1; and Fig. 3 is a detail horizontal section, on a reduced scale, through the mandrel-support and the adjustable slide plate and arm to which the support is secured.

Without going into details of the construction of the grinding machine, the method of carrying the work-holding attachment will be indicated. On the slide 18 is a circular plate 21, and a second similar plate 22 is centrally pivoted on the upper side of this plate. The upper plate carries a vertical post 24, provided with a vertical guide, on which is adjustably mounted a side-plate 25, pinioned with an arm 26. On this is adjustably secured a split arm 27, which supports the mandrel 28, on which the work-holding attachment is carried.

The slide 18^a is provided with bearings 37 at its opposite sides, in which is journaled a shaft or spidle 38, having a central pulley 39, located between the bearings 37, and adapted to receive a belt 40, to drive the shaft. On the end of the shaft is mounted a grinding-wheel 41, and on the bearing 37, adjacent to the grinding-wheel, is fixed an arm 42, projecting a distance equal to one of the radii of the grinding-wheel.

The work-holding attachment comprises a yoke, mounted on the end of the mandrel 28, and provided with arms 29 and 29^a, extending in opposite directions and having their end portions bent forward and arranged parallel to each other, the end of the arm 29^a being provided on its face adjacent to the arm 29, with a conical stud 30, and the arm 29 is provided with an interiorly screw-threaded perforation aligned with the stud and adapted to receive a screw 31, having a handle 32, and provided with a conical end corresponding to and opposite the conical bearing 30 in the arm 29^a. Between the bearing and the end of screw 31 is clamped a shaft 33, on one end of which is secured a pattern of matrix 34, shaped to correspond to the form of the work when finished. On the other end of said shaft 33 is carried the piece of work to be ground (indicated at 35 in the drawings), this work being usually a rough casting, or the like, corresponding generally to the pattern or matrix 34. The pattern and work shown are in the form of grooved sheaves or rollers, but other forms, it is evident, may be ground with equal facility.

August J. Schaefer, of Galion, O., has a half interest in the device.

Amalgamated Convention—Scale Provisions.

The twenty-first annual convention of the Amalgamated Association of Iron and Steel Workers adjourned at Detroit on Friday, May 29. The following officers were elected: President, M. M. Garland; secretary, John C. Kilgallen; assistant secretary, Stephen Madden, all of Pittsburg, were re-elected; trustees, John Pierce, of Pittsburg; Daniel Mullane, of Youngstown, O.; C. H. Kaufman, of Bridgeport, O.; vice presidents, W. A. Carney, of Pittsburg; David Llewellyn, of Wheeling; M. D. Cook, of Indiana; W. F. Hughes, of Muncie; Andrew McBride, of Niles, O.; Thomas Mason, of Birmingham, Ala.; delegate to American Federation of Labor convention, M. M. Garland. The wage committee was authorized to settle the remaining differences regarding the wage scale at a conference with the manufacturers' committee to be held at Youngstown. The convention will meet in Detroit again next year.

The scale has not yet been given out for publication, but, as stated last week, the principal charge is the advance of 50 cents provided for puddling. The paragraph relating to boiling is as follows: "For boiling, per ton of 2,240 pounds, 1 1-10c bar iron, $4.50; 1 2-10c bar iron, $4.62½. The balance calls for $4.75 on 1 3-10c; $4.87½ on 1 4-10c, and $5 on 1 5-10c. No corresponding advances are made in the regular scale for the finishing departments, but there are some new foot notes that will give the workers better pay under certain conditions.

The sheet mill and tin plate scales remain practically as before. The manufacturers, it is understood, will urge changes that will make the schedule more truly a sliding scale, and that will take some account of the actual market ratio between the price of imported tin plate laid down in New York and the market price of billets and tin plate bars.

A SLIGHT disagreement between the Brown Hoisting & Conveying Machine Co., of Cleveland, and some of its employes, over the matter of a half holiday on Saturday, developed into a question of union control of the works. The management promptly ordered a shut down, and old employes desiring to continue at work were instructed to apply as individuals. As fast as they did this they were set at work again. Many union men refused to return and organized to prevent the introduction of non-union men. Police protection was given those at work, but as yet only a partial force is operated. Molders at the East End foundry refused to work on castings to be delivered to the Brown works, and the same issue is promised in one or two other foundries having similar contracts.

A TRACT of coal land, comprising 12,200 acres, located in Allegheny and Westmoreland counties, Pa., eight miles long by five wide, lying upon the Allegheny river and the Allegheny Valley Railroad, has been purchased by an Eastern syndicate. Among the Eastern people who are connected with the syndicate are W. H. Whitney, of Boston, and W. C. Whitney, of New York, ex-Secretary of the Navy. The purchase price is not stated. It is said to be the intention of the company to establish a by-product coke plant and to supply gas to Pittsburg, Allegheny and neighboring towns.

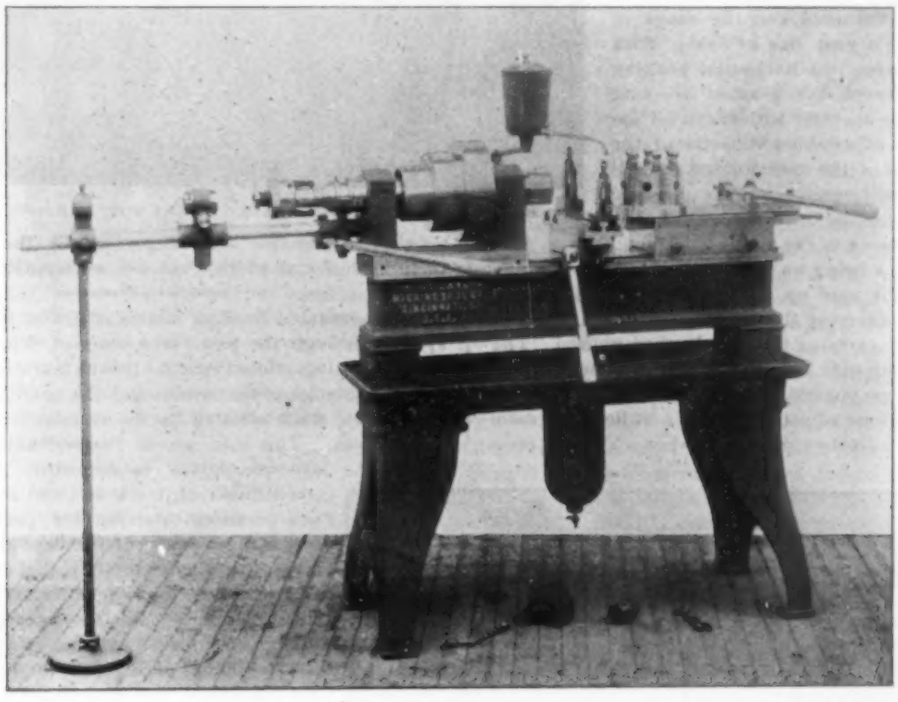
THE Buckeye Foundry Co., of Cincinnati, manufacturers of plumbing and sewer castings, valve and stop boxes and machine-made pulleys, has removed to its new plant, corner of Queen City ave. and Buck st., and under date of June 1 sends an invitation to its friends to visit the new works.

NEW SCREW MACHINE.

The accompanying half-tone shows the new No. 1 screw machine of the Davis & Egan Co., of Cincinnati, which has been built to displace the maker's old machine of the same size. The bed is of the box form, dove-tailed on top, and sets on short legs of a new shape, which are cast in one piece with the pan. The spindle is made from a special grade of steel, accurately ground, and runs in bronze boxes. The wire feed is arranged so that the stock is fed forward almost instantly and can be gripped or released while the machine is running.

The turret revolves automatically by a short movement of the lever and has six holes for the reception of tools. The indexing mechanism is of hardened steel, and the locking pin is forced into the various divisions by a spiral spring, the tension of which can be regulated to suit requirements. The turret slide is provided with adjustments in all directions to secure proper alignment with the spindle. The cus-off rest is operated by rack and pinion and has two tool posts provided with adjustable taper wedges for regulating the height of the tools. It is often desirable to use a forming tool in one of the tool posts for making cups, cones and other similar work.

The principal dimensions are as follows: Swing over bed, 12″; length of bed, 3′ 4″; diameter of hole in spindle, 1¼″; capacity with wire feed, 15 16″; largest diameter cone, 9″; width of belt, 2½″; diameter of turret, 6″; diameter of countershaft pulleys, 10″; width of belt, 3″; speed of countershaft, 250.



NEW SCREW MACHINE.

A Day of Iron Shipments to Pittsburg.

In the current issue of the *Bulletin*, General Manager Swank has an interesting editorial on the "Revelations of an Old Ledger." It reflects some of the side-lights thrown upon the manufacture and sale of bar iron in Pennsylvania, by the ledger of Isaac Proctor, a Johnstown, Pa., merchant, whose warehouses received bar iron from the forges of the Juniata Valley, pending its shipment in flat boats to Pittsburg. The article concludes: "The chief interest of this old ledger consists in its revelation of the fact that large quantities of Juniata bar iron were shipped to Pittsburg from Johnstown as early as 1816. Earlier shipments were made by water from Johnstown to the same destination, probably as early as 1800, but the ledger of Isaac Proctor shows conclusively that these shipments had attained large proportions in 1816, 1817, and 1818, in which years bar iron had not yet been made at Pittsburg. Next in importance among the facts disclosed by Mr. Proctor's ledger is the survival at Johnstown, down to 1812, of the British system of computing values, and the survival down to 1818 of the now long disused hundredweights and quarters."

Conclusions as to Mechanical Stokers.

At the recent St. Louis meeting of the American Society of Mechanical Engineers, Jay M. Whitham read a paper on "Experiments with Automatic Mechanical Stokers." The Wilkinson, the Coxe and the Babcock & Wilcox stokers are particularly referred to by the writer and the following summary is given of the conclusions reached by Mr. Whitham as to these three:

1. Each stoker seems well adapted to the conditions for which it was designed.
2. Each stoker gives ideal economic results when properly handled.
3. Stoker engines use from one-fifth to two-fifths of one per cent of the steam generated.
4. Fan blasts use from three to five per cent of the steam generated.
5. Steam blasts use from five to 11 per cent of the steam generated.
6. A defect, common to each of the stokers named in this paper, is a too scanty air space in the grate.
7. Neither stoker will develop as much capacity as will hand firing with stationary grates, having the same draught and coal conditions. Stokers, however, are not only more constant in the power developed than is a hand-fired grate, but are more responsive to fluctuations in the power demands. The stoker is always in the condition that a hand-worked fire is in just after its cleaning, i. e., always clean and "ready for a pull."

INFORMATION from Washington is that the attorney-general has decided to bring suit against certain manufacturing concerns in Northeastern Ohio—one at Massillon, another at Canton, and a third at Akron, which issued scrip to their employes in the panic of 1893. The 10 per cent tax on the issues of state banks and corporations will be sued for and judgment will also be asked for a penalty of 50 per cent. The firms in question acted under competent legal advice, and will contest the suit at every point. Their course was the only one that would have permitted them to keep running and pay wages, and was of incalculable benefit to their workmen. All the scrip has long since been redeemed, and prosecution now simply amounts to making an example of those who, in a grave emergency, acted for the welfare of those whose interests they were bound to consider.

FARWELL'S SAND PRESS.

Two types of the Farwell sand press, manufactured by the Adams Co., of Dubuque, Ia., are shown in the illustrations, and their appearance in the general market is the result of the experience of the Adams Co. with various classes of snap molding for hardware specialties. The ability of the operator to do a large amount of work with comparatively small exertion, and the multiple efficiency of a machine in the hands of an alert operator, explain the increasing use of such machines in the foundry; and the sand press commends itself to the average workman, where the molding machine might require special effort and the best co-operation by the operator to secure good results.

Fig. 1 shows the Farwell sand press, turret top, narrow gauge as it appears in use. Fig. 2 is the Farwell sand press with plain top and of broad gauge. The fact that the working parts are above the sand and are not subjected to the wear usual with like machines, is one of the features to which the makers direct special attention. One motion with the right hand brings the top in position and presses the mold, and the range of work includes the largest size of snap flask molds. The lever being in a horizontal position when the mold is pressed, the greatest pressure can be exerted by the operator with the least exertion. The lever is adjustable to the size of the mold and the weight of the operator and when it is set every mold will receive proper pressure without attention from the operator. The broad gauge machine, as shown in the cut, can be set over a sand heap, and the machine being on wheels, can be moved along the floor as the sand is used up and the floor is filled with molds. This saves carrying the molds a distance to their place on the floor, or carrying them back when poured. The weight of the machine with the plain top is 285 pounds, and with the turret top, 300 pounds. From the top of the table to the presser top, at lowest adjustment, is five inches, the same interval, at highest adjustment is 18 inches. The extreme length of flasks that can be pressed by the machine is 28 inches. Extreme width, 18 inches, extreme depth, 10 inches.

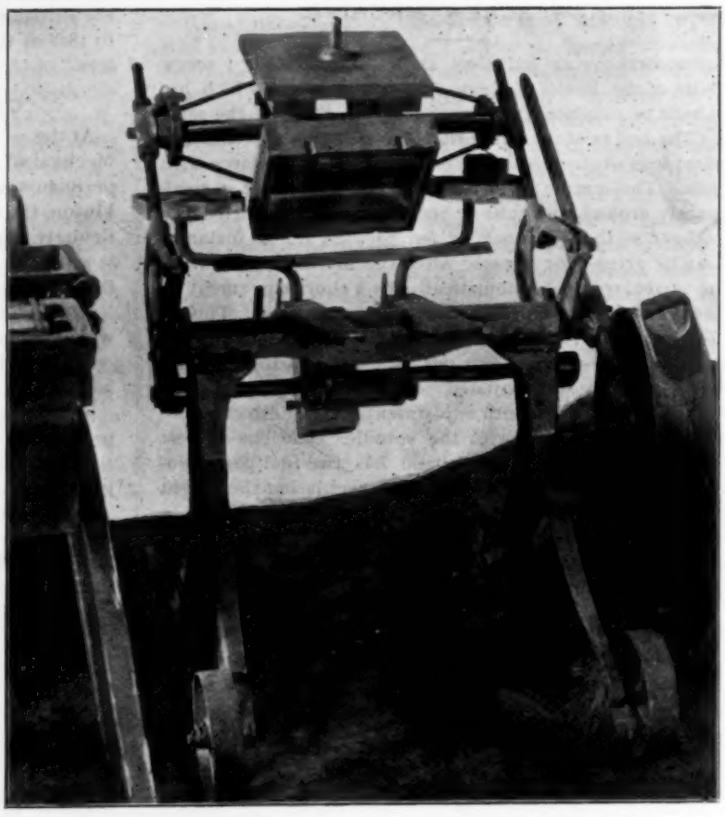


FIG 1.—FARWELL'S SAND PRESS, TURRET TOP, NARROW GAUGE.

FIG. 2.—FARWELL'S SAND PRESS, PLAIN TOP, BROAD GAUGE.

THE admirable conduct of the affairs of the Pennsylvania system through the past three years of depression has been reflected in its various reports. It is no less strongly impressed by the character of the service and the condition of road-bed and rolling stock as noted by the traveler over the Pennsylvania lines. The ride across Pennsylvania by night, for example, gives opportunities for testing the smoothness of track attained in years of study and persistent striving for perfection in road bed maintenance. If the daylight ride is taken across the Keystone State, there is added to the ease of riding, the rugged beauty of the scenery that does not lose its interest and charm, though the trip may be oft repeated. From the standpoint of dispatch, the Pennsylvania road has a schedule that commends itself to the busy man. Between Pittsburg and New York, Philadelphia and Washington, the arrangements for speedy travel have been brought to the highest efficiency. Between Cleveland and Pittsburg a special study has been made of convenience and time saving. It is possible to leave Cleveland in the morning, spend most of the business hours of the day in Pittsburg, and return at a convenient hour in the evening.

AT the meeting of the Civil Engineers' Club, of Cleveland, in the club rooms, May 26, there were present 85 members and visitors, including many ladies. Dr. D. C. Miller read a paper on "Phenomena of Electrical Discharge in Vacuo," describing and experimentally illustrating the researches of Geissler, Hittorf, Crookes and Roentgen. The discovery of the X-rays was demonstrated, and the various theories proposed to account for the phenomena briefly explained. The practical applications of the X-rays were brought out by the aid of the fluoroscope and lantern projections. After the meeting those present avialed themselvesof the opportunity, by the aid of the fluoroscope, of seeing the bones of their hands and wrists. F. A. Coburn, secretary.

SYSTEMS FOR UNIFORM GRADING OF IRON.

BY THOS. D. WEST.

The unequal diffusion of silicon and sulphur throughout a furnace "cast" and the necessity for a reform that will assure analyses representative of the whole or any part of a "cast" as shipped to the founder, was first discussed by the writer in a paper on "Segregation of Cast Iron at the Furnace and Foundry," before the Foundry Association, in Philadelphia, Dec. 4, 1895, and published in the *Iron Age* and *The Iron Trade Review* of Dec. 12, 1895. This the writer followed with a paper before the Western Foundrymen's Association, Chicago, April 15, 1896, which was generally published by the trade papers. At this latter meeting, the writer noted with much pleasure the statement of Mr. D. L. Cobb, representing the Sloss Iron & Steel Co., Birmingham, Ala., that this company had recognized the necessity of improvement in the present practice of grading analyzed iron. As one means of remedying the evils referred to, the Sloss Co. is having four analyses made of each "cast" instead of the one obtained by furnaces that have adopted chemistry for grading iron.

Believing the advance thus inaugurated at Birmingham should be given the fullest publicity, the writer presents this brief memorandum and trusts that others will take the subject under consideration, to further the end so desirable and necessary to be attained.

It is certainly encouraging to see the step taken by the Sloss Iron & Steel Co., as it will likely influence other furnacemen to strive for the same end, or go one better, so that it will not be long ere all furnaces will have some system giving the founder better assurance as to the analysis of the iron on which he depends so much to give desired results.

While the writer does not wish to discourage the furnacemen from taking any number of analyses of each "cast," he would advocate the following, as another method of assuring the founder that the analyses he receives of a "cast" or shipment of iron represents the whole or any part of it:

First: In loading the pig metal at the "casting house," let a sufficient number of buggies be used to convey all of a cast to the point of piling or shipping, before any iron is removed from off the buggies.

Second: Have the "iron storers" start at one end of the metal train and each man take a pig off from each car in concerted order, piling the same in regular form. As each man reaches the end of the train of iron buggies, he would return to the starting point, thus giving a continuous circuit of travel by the iron storers until all the train is unloaded and the iron placed in yard piles or distributed over cars for shipment. Such a plan need cost nothing more than that at present followed by furnaces in piling or shipping iron. In fact, if anything, it would be generally more economical. It would guard against any one of the storers shirking duty, as all would have to follow the leader or drop out of the file and make indisposition to work very conspicuous. This method would insure a most thorough mixing of the cast and thereby make the one analysis, as at present, generally taken and forwarded to the founder, all sufficient and better in many cases than three or four analyses for the furnace and foundry to keep track of from every cast or car of iron.

Although this plan differs from that described by Mr. Cobb, the step taken should be heartily approved. And now that the Sloss Co. has led the way, a free discussion of plans to insure correct analyses being presented, to aid the founder in obtaining desired results from mixtures of iron, should be encouraged by all progressive furnacemen and founders. This is a reform fully as important as that of grading iron by analysis (instead of fracture practiced a few years back), now adopted by nearly all furnaces as the result of continued agitation and of concerted foundry association effort.

This article was written right after Mr. Cobb's comments were published in the *Iron Age* and *The Iron Trade Review* of April 22, but held back to get an early presentation at some of the foundry association meetings, but owing to their being crowded with previously prepared papers, I have handed it to *The Iron Trade Review*, and trust that other furnacemen will be heard from in seconding the Birmingham movement to further aid in lessening the founder's troubles.

NEW PUBLICATIONS.

PRESS-WORKING OF METALS.—A treatise upon the principles and practice of shaping metals in dies by the action of presses, together with a description of the construction of such implements in their various forms, and of the materials worked in them. By Oberlin Smith. Illustrated with 433 engravings—276 pages. 8vo. Cloth. $5. New York: John Wiley & Sons.

This volume has been prepared to fill the need for something more than the fragmentary literature extant, which covers but few of the lines of inquiry included in metal-working. The facts and the principles, the knowledge of which is necessary to the successful design, construction and operation of presses and dies, could find no better exponent than Mr. Smith. His years of experience in this class of work and his working acquaintance with mechanical problems outside of his special field prove an excellent equipment for the work he undertook. The wide field of the press in metal shaping and the increasing variety of articles manufactured by the use of the press and die is an index to the activities of designers in these lines. There are limitations and these the author indicates in a general way. Beginning with the earliest and rudest attempts at metal forming by stamping, the author discusses in turn the various classes of presses and dies; cutting, bending, curling, seaming and drawing processes; following with chapters on re-drawing and coining processes, press-feeding, manifolding work in dies, paper-working, hammer blows, power required for presses; and lastly some discussion of the lines on which the art will yet be developed. The descriptions are clear and full, and the illustrations ample for a perfect understanding of the text.

A Piece of Iron 2,000 Years Old.

S. T. Wellman, the well known metallurgist, of the Wellman-Seaver Engineering Co., Cleveland, has a portion of a round bar of iron—and a few like pieces are held in the United States—that antedates the Christian era by two or three centuries. The iron, which had been originally hammered into plates, and was deeply rusted from age, was found a few years ago by Dr. Karl Humann, in the ruins of the Temple of Artemis Leucophryne at Magnesia, Asia Minor. Dr. Humann sent it to Hallbauer in Germany and the latter made from a portion of it a memorial tablet. This was presented to Bismarck in April, 1894. It bore this inscription, in German: "For you, Prince Bismarck, the iron chancellor, Hermogenes forged this iron at Magnesia, 200 B. C. Humann found it in the Temple of Artemis after 2,000 years and sent it to Hallbauer, who gave it the form in which it shall bear witness that your deeds shall outlive millenia."

At the time of the presentation to Bismarck *Stahl und Eisen* gave a photographic reproduction of the plate and an account of the discovery of the iron. The Temple of Artemis, one of the most magnificent of ancient monuments, was rebuilt about 300 B. C., though by some the date is put at 200 B. C.

The metal is described as approximating steel in its composition, though closely akin to malleable iron. It was made at a low temperature and great care was necessary in the forging. It was found rather difficult to roll the pieces that were preserved as relics, these having a diameter of about ½-inch. One analysis showed carbon 0.20 per cent; phosphorus, 0.016 per cent; iron, 92 71 per cent. Another gave carbon 0.23 per cent; phosphorus, 0.0223 per cent; sulphur, a trace, with no distinguishable amount of manganese or silicon. An analysis in the laboratory of Prof. Ledebur showed 1.01 per cent of slag, 0.025 per cent of phosphorus and 0.061 per cent of carbon

AN important pig iron selling firm has secured for distribution among Western foundrymen, several hundred copies of Mr. Thos. D. West's paper on "Standard Physical Tests for the Product of the Blast Furnace and Their Value," read at the Pittsburg meeting of the American Institute of Mining Engineers. The fact is noted as indicative of the growing interest in literature calculated to surround operations with cast iron with added safeguards and give greater assurance as to results.

AT Youngstown, O., Hannah furnace, of the Mahoning Valley Iron Co., went out this week to await a change in the iron market, and the Youngstown Steel Co. has banked its furnace pending the connection of the newly completed stoves

COST OF BASIC OPEN-HEARTH PLANTS.

[From a specially contributed article in *Tin and Terne*, Pittsburg.]

With the basic open-hearth process, sulphur and phosphorus are readily reduced to negligible percentages, while the carbon can be varied at will, and increased if desired at the end of the melt. Silicon alone must be regulated in the charge, and even in this case may vary between one and one-half per cent, and may be more or less than these extremes, though this is not desirable. The pig must be chilled, a standard Bessemer pig answering very well, while Southern basic pig is equally available and may generally be had at a lower price. At this point it must be borne in mind that one of the effects of the billet combination, if successful, will be favorable to the open-hearth operator; the success of the billet pool being dependent upon a curtailment of production, which will of necessity overstock the Bessemer pig iron market, resulting in as low prices as are consistent with manufacturing costs.

The scrap charge permissible in the basic open-hearth furnace is exceptionally high, and there are no restrictions of importance on the quality. As high as 60 % of the charge may be scrap, according to good authorities, while 50 % may be worked under all circumstances. The scrap may be wrought or cast, railroad scrap being well adapted to the purpose. In such a plant as we are considering, the scrap produced in casting ingots, rolling the tin plate bars and shearing the black plate, are all readily available and may be considered as bringing the full market price of scrap. In addition to this, wasters which are now put upon the market to bring what they will, can be more advantageously applied by being re-melted, while benefitting the general market by keeping out of it these very poor wasters.

If desired, a portion of the charge may be ore. We may, therefore, use pig iron, scrap and ore, in almost any desired percentages, and of almost any quality, and still secure a good, soft, homogeneous steel.

It is our purpose here to refer only to such a basic open-hearth plant as would be appropriate as an adjunct to a tin plate plant. As the size of the steel producing plant diminishes, the cost per ton of product increases, at first very slowly, and then more rapidly. The minimum size of a comparatively economical plant may be safely taken as not larger than a pair of 20-ton furnaces. A blooming mill is of course out of the question, and it will be desirable to cast ingots of such a size as to be readily rolled down into tin plate bars in a bar mill. Some half-dozen or more tin plate plants are already provided with bar mills, some of which are used only in emergencies, lying idle the greater part of the time. Where a bar mill is to be erected a three-high 24″x72″ mill will probably be found best adapted to the work, and at least two sets of rolls should be provided, in order that at least two different widths of bars may be produced, the thickness of course being under control by adjusting the rolls. Separate sets of ingot molds are likewise to be provided. The ingots are to be bottom cast, six, eight or ten molds being placed on a plate, communicating at their bottoms by runners with a central fountain where the pouring is done. The molds are "separable," and produce two ingots, one above the other, which are broken apart. The weight of ingot should not exceed 200 to 250 pounds. A five-foot mold, producing two ingots each 30″ long, could make either ingots 5x5, weighing 187½ pounds, or ingots 3x8, weighing 180 pounds. Ingots of this weight would be very easily handled at the mill, and would require but two sets of rolls. The rolls should be provided with an edging pass to be used when the reduction is about half accomplished. With these two sizes, tin plate bars would be rolled of any desired length and thickness, and either five or eight inches wide.

The full length of time for a heat is 12 hours, but running from 6 P. M. Sunday to 3 P. M. Saturday, a total of 141 hours, 14 or 15 heats are likely to be secured, but taking only 13 heats per week, and allowing seven weeks in each year for stoppages for repairs, etc., the annual product of a pair of 20-ton furnaces may be safely estimated as follows:

Charge of one furnace	20 tons.
Two runs, 13 heats each	26 "
Weekly charge	520 tons.
Weekly product, ingots	468 "
Allow 10 per cent waste to ingot	52 "
Allowing seven weeks' idleness leaves	45 weeks
Annual product, ingots	21,060 tons
Allow five per cent waste in bar mill	1,053 "
Annual product, bars	20,007 "
Allow 20 per cent waste, black plate mill	4,001 "
Annual product, black plates	16,006 "

Such a plant would therefore keep supplied eight to ten black plate mills, each producing from 1,600 to 2,000 tons of finished black plates per year.

In casting up the items entering into the cost of a ton of tin plate bars we have the following items: (1) cost of charge, (2) cost of conversion, including supplies, repairs and labor in melting and casting, (3) interest on steel plant investment, (4) cost of operating bar mill, and (5) interest on bar mill investment.

The cost of operation for one year will therefore be as follows:

(1) Cost of charge. This item will differ in different localities, not only because prices and freights will vary, but because the most economical proportions of scrap, pig, etc., will vary as well. In a general way, however, we may estimate 50% Southern basic pig, at $11 per ton delivered, and 50% scrap at $8 per ton. This figure covers a pretty good grade of scrap, because shea ings, wasters, old annealing pots, etc., will all be used out of the mill and charged up at $8, where in many cases they would not bring this much if sold. The charge for one year will be, for two 20-ton furnaces, 13 heats per week, 45 weeks per year, 23,400 tons, or 11,700 tons pig, and 11,700 tons scrap.

(2) The cost of conversion, including all wages in melting and casting, power, replacing molds, repairs to furnaces and fuel, is placed by good authorities at $6 per ton of finished ingots.

(3) Interest on steel plant investment. The entire cost of the furnace, plant, including building, gas producers, furnaces, cranes, molds, etc., is figured at the outside at $60,000, six per cent on which is $3,600.

(4) Cost of operating bar mill. This item, covering all expenses of labor, fuel and repairs from the ingot to the boshed tin plate bar, can be safely put down at $1.75 per ton of bars, where the mill is run about full time, as in the present case.

(5) Interest on bar mill investment. Where it is possible to attach the bar mill to the tin plate train, the investment will be small. This may be done in many cases, because in nearly every tin plate train in the country an excess of engine power has been provided. A three-high 24″ x 72″ bar mill, with foundations and trolley for conveying the ingots will not cost over $6,000. The heating furnace should be 20′x7′, with five or six small working doors in two rows, and should cost not over $5,000. If the bar mill cannot be attached to the tin plate train, an addition to the open-hearth building will be needed, with a separate engine; swelling the cost by say $4,000, and making the total cost of bar mill, furnace, etc., $15,000, with a chance of cutting down on this if the mill can be attached to a train already running.

The cost may then be summarized as follows:

(1)	Charge, 11,700 tons pig, $11	$128 700 00
	11,700 tons scrap, $8	93,600 00
(2)	conversion, 21,060 tons ingots, $6	126,360.00
(3)	Interest furnace plant, $60,000	3,600.00
(4)	Operating bar mill, $1.75 on 20 000 tons bars	35,000.00
(5)	Interest, bar mill plant, $15,000	900.00
Cost of 20,000 tons tin plate bars		388,160.00
Cost of bars per ton		19.40

The writer has endeavored in the above estimate to allow fully for all expenses, and where there was any doubt, to give the outside rather than the inside figure. In the estimate of the cost of plant, the figures given would doubtless be shaded somewhat by contractors. The costs of materials may be a trifle low for Pittsburg and vicinity, but the farther west we go, the lower will be Southern pig, while at the same time the higher will be the Bessemer steel with which our product comes into competition. Less than $20 a ton for tin plate bars of open hearth steel is certainly a figure which should lead each tin plate manufacturer to examine closely into the local conditions which affect the question in his own case, which may raise or lower the figure somewhat.

For tin plate making, the quantity of carbon desirable in open-hearth steel will generally run between 0.10 and 0.12 per cent. On account of the softness of open-hearth steel, a cer-

tain percentage of carbon in it makes it the equal of Bessemer steel with a fourth or a fifth less carbon. Open-hearth steel with 0.10 to 0.12 per cent carbon will be if anything softer than Bessemer with 0.8 to 0.10 per cent. The basic open-hearth furnace permits of the regulation of carbon from as high as 1.10 down to 0.08 per cent. Sulphur and phosphorus can be reduced very low, but it has been found that in tin plate rolling it is not desirable to eliminate these elements too far, on account of the liability of the sheets in the pack to stick together, especially with the lighter gauges., so that it is well to keep the phosporus and sulphur up to 0.05 or 0.06 per cent, which is several times the minimnm obtainable.

Opinions differ as to the desirability of natural gas in operatlng an open-hearth furnace, some steel authorities considering this fuel preferable, while others do not consider its use advantageous, if coal for producer gas can be obtained at anything like reasonable rates. If no sulphur be present in the gas, it is more desirable than if a considerable percentage of sulphur is contained.

CHARCOAL IRON-MAKING IN THE SOUTH.

Slowly but surely during the past decade, the charcoal blast furcaces in the South have gone out of blast, until to-day, in the eastern district of Alabama, there are only two in active operation. In the same district, only a few years since, there were the following named furnaces manufacturing car wheel pig iron regularly: The Brierfield, in Bibb county; the Shelby, in Shelby county; the Clifton, at Ironaton, in Talladega county; the Woodstock and Jenifer, near Anniston, in Calhoun county; the Bass, st Rock Run, in Cherokee county; the Langdon, the Tecumseh and the Round Mountain, also in Cherokee county.

All of these, today, are out of blast and out of repair, except those at Shelby and Rock Run. The Clifton Iron Co. are remodeling and rebuilding one of their furnaces at Ironaton to manufacture coke pig instead of charcoal. New Weimer engines, built at Lebanon, Pa., will be used to furnish the additional power to blow the new furnace. Each of these engines has a capacity of furnishing 384 cubic feet of air per strokes with 45 strokes per minute as normal speed. The furnace is to be built 70 feet in height instead of 40 feet, the present height, and the diameter of bosh will be 15 feet. With the improved practice in iron metallurgy this furnace ought to smelt 150 tons of pig each day. The Bass furnace at Rock Run was rebuit in 1894 5, for making charcoal iron, and is in steady blast to day. A large proportion of the car wheel iron made at this plant is used at Fort Wayne, Ind., in the car wheel shops at the "Bass Foundry."

The Round Mountain furnace was in blast in 1895, but most of the others named above were blown out between '91 and and '94, though some like the Tecumseh furnace have been out of blast for a longer period.

The natural inquiry, when this condition of the charcoal iron industry is being discussed, is: What are the causes which have produced such stagnation? Some of these causes are attributable to the depressed condition of the iron markets; some to the comparative scarcity of timber for charcoal within reasonable distance for wagon haul; some to the fact that the deposits of brown iron ore (limonite) which carry a sufficiently low percentage of phosphorus for the manufacture of good grades of charcoal car wheel pig afford only a very limited supply of such grade ore; and one very important cause which has led to the present condition is the fact that with the advanced knowledge and practice in the metallurgy of iron, it is possible under favorable conditions to manufacture coke iron in the South at such low cost as to enable the iron masters to successfully compete with those in Pennsylvania and Ohio, but where charcoal iron is made, such competition becomes more difficult.

It is within recent years that the Shelby, Woodstock and Round Mountain car wheel iron ranked among the best pig in the market, while complaint against Rock Run pig was very rarely heard.

When such experienced ironmasters as Capt. Bush, president of the Clifton & Shelby Iron Co., pursue the policy of rebuilding blast furnaces to change the fuel and increase the capacity, as he is doing at Ironaton, there can hardly be any question but that the change is made from such prudential motives as will result profitably. There might be some reasons for supposing that this would be difficult at Ironaton, where freight on coke must prove an important factor in figuring the cost of making pig. At a casual glance it would appear almost absurd to think that any furnace situated at a distance from the coal fields and limestone quarries, could successfully compete with those in the Birmingham district, where coal, iron ore and limestone are within such short distances of the furnaces, that the hauling is done on private railroads owned by the iron companies. But at both Anniston and Ironaton coke and limestone must be hauled by one or more of the railroad companies which compete with each other for the business of the country, and at Ironaton the location is such that only one line of railway passes through the vicinity.

There are arguments, though, which, when carefully considered on the other side, clearly demonstrate that these outside furnaces situated in the brown iron ore districts, have advantages sufficiently strong to counterbalance the disadvantages I have directed attention to:

First—The ore for the burden of the furnace is far richer in metallic iron than in the red hematite district, consequently when strict attention is given to the selection of ore, a ton of pig can often be made from two tons or less of ore in the brown ore district, while two and a half or three tons of ore will be needed in the red ore district to produce the same quantity of pig.

Second—The cost of mining in the brown ore district at the deposits, such as Ironaton, Baker Hill, Langdon, Rock Run and Dykes, in Alabama, and at Reed's Ledbetter and Wray, in the Cedartown district, Emerson and Big Banks in the Cartersville district, in Georgia, is not any greater, and sometimes even less than at Red Mountain.

Third—Pig iron manufactured entirely from brown ore grades higher, is considered more desirable by founders, and other iron workers, than that made entirely from red ore. Even a mixture of brown ore is considered, if not absolutely essential, at least very desirable, and we find the Birmingham and Tennessee coke furnaces located in such near proximity to the coal fields and cheap coke, purchase brown iron ore from the deposits located from 30 to over 100 miles distant—which is a far more costly arrangement than the purchase and hipment of coke and limestone.—[W. M. Brewer, in Dixie.

The Composition of Steel and Tensile Strength.

The number of recorded observations inteuded to elucidate the far-reaching question of the influence of the various components of steel upon its structural strength is already very large, and much positive information has been derived from them; but the want of uniformity in the conditions not only in the making of the metal but in the rolling of test pieces, to say nothing of the variations in methods of testing and analysis, renders them bewildering when it is attempted to generalize from a wide range of data not strictly co-ordinate. Hence, it is often best to study each group of tests and analyses by itself, in order that comparisons may be on the same level, and the larger the number of cases coming within the limits of rigidly similar conditions, the more instructive and reliable are the results.

Research in this direction has recently been advanced by what is perhaps the most systematic special investigation of the kind ever undertaken. It has been conducted by Mr. H. H. Campbell, superintendent of the Pennsylvania Steel Co., and the chemical and physical laboratories of that establishment were at his command. A series of test-bars were collected from about 3,000 open-hearth heats, which had been rolled under precisely similar conditions, and which were tested both physically and chemically. From the records of these bars, Mr. Campbell has worked out the effects of the various components by a mathematical analysis, using the method of least squares. From the results he has then derived formulæ for determining the strength of steels of known composition; and these formulæ, considering the patient thoroughness of the inquiry and the wide basis on which they rest, ought to have substantial value. In a forthcoming book on "The Manufacture and Properties of Structural Steel," to be issued by the Scientific Publishing Co., Mr. Campbell will give to the profession the extremely valuable results of this investigation.—[Engineering and Mining Journal.

ORGANIZATION FOR MANUFACTURERS.

BY THEODORE C. SEARCH.

[From the address of President Search, of the National Association of Manufacturers, before the National Convention of Foundrymen, at Philadelphia, May 12].

Perhaps the most important thought I can present to you is my abiding faith in our own country and the relative value of its working energy. Mulhall, in his recently published tables, gives some statistics of the productive energy of various countries, and he shows that aggregate of all the energies in use in the United States in 1820 was equal to 446 foot tons per capita. In 1890, this had increased to 1,940 foot tons, and the position of the other countries was as follows:

	Foot Tons.
England	1,470
Germany	902
France	910
Spain	590
Austria	560
Italy	380

To present this comparison in a form more readily comprehended, let me reduce it to percentages, taking the productive capacity of the United States as 100. Then we will have:

England	70
Germany	46½
France	47
Spain	30
Austria	29
Italy	20

From this, it will be seen that we produce per capita 1 3-7 times as much as England, 2 1-10 times as much as Germany or France, 3 1-3 times as much as Spain or Austria, and 5 times as much as Italy. These figures have a deeper significance than a superficial glance would show, as they indicate that our own country is a productive factor that cannot be much longer confined to its own limits for trade, that the higher wage of our labor is being rapidly discounted by the effectiveness of our methods, and that the markets of the world are not so far from our grasp as the workingman may imagine.

We are rapidly demonstrating that it is possible to overcome the higher wage earnings of our labor by a greater product, and that it pays to maintain the splendid efficiency of our workmen for the sake of its greater value. That it has been possible to maintain the wages of our labor in the face of continually declining prices of nearly all products, has been due to the constantly increasing productive capacity of our workmen and our machinery. The substitution of science for the "rule of thumb" has also contributed to the same results. In your own industry improved cupola construction has lessened the consumption of fuel in melting iron, molding machines have largely increased the output per man on certain lines of work, while improved appliances for handling material, molds and castings have materially lessened the cost of labor by increasing the efficiency of each unit.

In the manufacture of iron and steel there has been a wonderful increase in the productive capacity of labor through better methods and more efficient machinery. The production of pig iron in the census year 1870 averaged about 53 gross tons for each man employed in the industry; in 1880 it was about 81 tons, and 1890 it was about 321 tons. In 1876 the average annual capacity of each blast furnace was only 6,611 gross tons, while at present the average is 37,065 gross tons, so that while the total number of blast furnaces has decreased from 713 in 1876 to 469 at present, their aggregate annual productive capacity has increased during the same time from 4,874,312 gross tons to 17,373,637 tons. In the last four years the number of Bessemer converters has increased only from 95 to 99, yet the productive capacity has grown from 5,857,143 gross tons in 1892 to 9,472,350 tons at the beginning of this year.

In 1884 the average daily output of coal for each man employed in the bituminous mines of Pennsylvania was 2.18 tons, while in 1894 it was 3.22 tons, and during the same ten years the output of anthracite increased from 1.70 tons per man per day to 2.07 tons.

The evolution of our textile industries has been marked by a marvelous increase in the productive capacity of labor, of which I have time to give but few illustrations. The introduction of the Brussels power loom in 1848 by Erastus B. Bigelow increased at a single stride the productive capacity of a single weaver from three or four yards of carpet daily to 20 or 25 yards. Forty years ago our woolen manufacturers used a broad loom which ran at about 40 picks per minute; now they run up to 100 picks and more.

In the manufacture of cotton goods there have been wonderful improvements in all the processes of carding, spinning and weaving. In 1870 the best type of frame spindle which was available to our cotton manufacturers was capable of 5,500 revolutions per minute, while in 1890 the possible speed had increased to 10,000 revolutions, and since that time there have been still further developments in this line. From the hand loom to the power loom was a great step in itself, but instead of the machine which formerly required the undivided attention of an operative, we now have looms which are so largely automatic in their operations that a single weaver can tend eight of them.

I might go on thus from industry to industry, showing how invention has supplemented the manual skill of our laborers and enormously increased their productive power, but what I have said will suffice for purposes of illustration and to demonstrate why our labor though highly paid is not dear.

Let me pass now to another thought which is particularly pertinent to this occasion. This is essentially an era of organization and I view the multiplicity of trade and technical associations as an evidence of the recognition of the need for concerted action in striving to attain desired objects. There are distinct fields of usefulness for all these various organizations, and I feel assured that you who have participated in the discussions of the Foundrymen's Association of Philadelphia, the Western Foundrymen's Association or any of the kindred organizations, can furnish ample evidence of the benefit which you have derived from such interchange of thought and exchange of ideas. The man who does not keep closely in touch with his competitors in these days is likely to find himself far behind in the race. No man has a monopoly of the good ideas in any branch of industry and there is no man who is so well informed, so thoroughly conversant with the details of his own business that he can learn nothing by discussion with his fellow manufacturers. Those who know the most, those who are the most progressive in their business, are the most willing to acquire new ideas which will place them still further in the lead.

The purposes of this convention—to bring the foundrymen of the country together in a national assemblage and to encourage the formation of local organizations—are indicative of the needs of the day, not only in this particular branch of industry but in all lines of business. Local associations with concentrated memberships are able to discuss in frequent meetings such topics as are local in their importance or of technical interest. For a national association, representing the constituencies of all the local organizations, there is also a distinct field of usefulness in the consideration of broader problems which bear upon the industry at large without regard to locality. There need be no conflict between local and national associations for each is useful to the other. Along certain lines a national body can exert more powerful influence than is possible to any local organization, while in other matters a local association can do all that is needful.

We have national organizations of manufacturers of boilers, glass, wagons, agricultural implements, iron and steel, carriages, furniture, stoves, woolen goods, bicycles, bricks, cigars, confectionery, lumber, paints and varnish, and many other articles. Each of these organizations voices the sentiments and exerts the influence of an important and powerful constituency. As representing the interests of great industries, the importance of these national associations can not be questioned.

But there are needs which even these organizations do not fully meet. There are problems which have an equal interest for all lines of business and for all branches of manufactures, and their successful solution demands the united action of all the interests which are involved. It was this condition of affairs which gave birth to the National Association of Manufacturers, which aims to unite all manufacturers in their efforts to secure those results which are of equal importance to all of them. It is not the aim of this association to supplant any of the other national or local organizations, nor to interfere with their work in any manner. On the contrary, it is our purpose to supplement their efforts and to extend their influence, and to unite in one powerful movement all the forces now separ-

ately and independently exerted. The possibilities of such a concentration of power are tremendous. When the manufacturers or the United States shall lend their united energies to the accomplishment of any desired result, there is no obstacle which can bar their progress. In the belief that every attempt at organization, either local, state or national, is a recognition of this possibility, I view with great pleasure this present gathering of foundrymen from every section of our country, and I wish you all possible success in the work of this convention.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants :—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

The Union Foundry & Mfg. Co., of Dayton, O., has been incorporated with a capital of $50,000.

The S. Morgan Smith Iron Mfg. Co., of York, Pa., has been chartered, with a capital of $250,000.

Frank Heywood, Minneapolis, Minn., wants to buy a second-hand Corliss engine, about 50 h. p.; must be guaranteed.

The Withington & Russell Co., Nashville, Tenn., contemplates putting in an electric light plant for lighting its factory.

The Greensboro Furnace Co., Greensboro, N. C., will be in the market for furnace equipment. J. D. Kease is general manager.

Ammon B. Collier, Elizabethville, Pa., is building a new foundry and brass works, and will need some macniinery in this line.

The West Mfg Co., of Buffalo, N. Y., has been incorporated for the purpose of building all kinds of machinery. The capital stock is $40,000.

Thomas Rosser, late of Appin, Ont., will start a barb wire factory in London, Ont., to be equipped with modern machines, to which may be added wire nail machinery.

The Fanning Cycle Mfg. Co. has been incorporated at Chicago, with a capital stock of $20,000, to manufacture bicycles, by Frank J. Fanning, William P. Nelson and William C. Malley.

West Mfg. Co., of Buffalo, has been incorporated to manufacture machinery and tools. The capital is $40,000. A. F. West, C. V. Boughton, W. L. Marcy and others of Buffalo are interested.

The Abingdon Wagon Co. has been incorporated at Abingdon, Ill., with a capital stock of $50,000, to manufacture wagons, by Frank Spies, A. B. Spies, Jr., William Spies and Henry Spies.

At the office of the Supervising Architect, Washington, D. C., sealed proposals will be received until 2 P. M., June 19, for furnishing all labor and material and erecting complete one electric passenger elevator, etc., for the United States court house and postoffice building at Springfield, Ill.

Additions, Enlargements, Removals, Etc.:—

The Standard Tool Co., Cleveland, will erect a three-story addition, to cost $10,000.

The McIntosh-Hemphill Co., Pittsburg, has commenced a large addition to its plant. A portion of the old plant will be rebuilt.

Joseph Reid, manufacturer of the Reid gas engine, Oil City, Pa., is adding a new foundry to his plant. The machine shop will also be enlarged.

The Star Drilling Machine Co., of Akron, O., will erect two additions of brick and stone, one will be 36x30 feet, and one story, the other 50x60 feet, and two stories.

The Chattanooga Steel Roofing Co., Chattanooga, Tenn., is adding an extension to its plant. The addition, when finished, will nearly double the capacity of the works.

The Slaymaker-Barry Co., of Lancaster, Pa., will build new lock works, and Connellsville, Pa., citizens have within $2,000 of the needed subscription of stock to bring the industry to that place.

Blakeslee Bros. & Co., of Southington, Conn., has reorganized as the Blakeslee Forging Co., capital $50,000. An important addition to the factory building will be made and new hammers put in.

The Jno. Dunlap Co., stamped and japanned ware, Pittsburg, will remove and considerably enlarge its plant. The new location will be at Hays Station, on the Pittsburg, Virginia & Charleston Railway.

W. F. & John Barnes Co., Rockford, Ill., is enlarging its plant by putting up a four-story addition, 100 feet long. The membership of this company has recently been augmented by the admission of the sons of the Messrs. Barnes.

The Cleveland Frog & Crossing Co. has contracted for an iron building 100x170 feet, to be used for storing tools and machinery. The company is well supplied with orders for both electric and steam roads.

The Kelly & Jones Valve Mfg. Co., Greensburg, Pa., has let the contract for an extensive addition to its works. Two hundred additional skilled workmen will be given employment. The addition will be a two story brick building, 120x40 feet.

The United States Radiator Co., manufacturers of steam and hot water radiators, at Saltsburg, Pa., has decided to remove its entire plant to West Newton, Pa., the citizens of which place have deeded the concern a plot of ground of 2½ acres situated on the railroad and a cash bonus of $10,000. The concern will employ 75 men at the start out and expects to increase this number as its trade extends.

Fires and Accidents:—

Fire did $2,000 damage to the Bethlehem (Pa.) Foundry & Machine Works; insured.

Dispatches concerning the St. Louis tornado say that the walls of the Ætna Iron Works engine house blew in and the engineer was scalded to death; also that the Consolidated Wire Works were badly wrecked.

A fire in the Bethlehem Foundry & Machine Co.'s Works, Bethlehem, Pa., destroyed, on May 20, the storage house and blacksmith shop, together with a number of papers and plans. The loss is said to be fully covered by insurance.

A Lancaster, Pa., dispatch says that the Columbia (Pa.) Rolling Mill Co.'s mill was badly damaged by a tornado on May 28, the puddling furnaces being wrecked, one workman killed and several injured. The damage is estimated at $20,000.

New Construction:—

The Pittsburg Granite Wood Co. will erect a plant at Zelunople, Pa.

The Blackham Mfg. Co., Pittsburg, will erect a large plant at Zelienople, Pa.

Surveys have been completed for the new P. & W repair shops at De Forest, O.

The Murray Mfg. Co., Pittsburg, will erect a four-story bicycle factory of brick and stone.

The East End Metal Co., Pittsburg, will erect a brass foundry. It will be of iron, 100x50 feet.

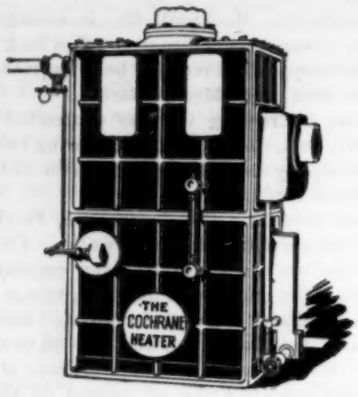
The Ohio River Road has prepared plans and secured ground for a new roundhouse and repair shops at Wheeling, W. Va.

The Sharpsburg Bridge Co. is receiving bids for the erection of the new bridge, at Sharpsburg, Pa. George A. Chalfant is president.

Smith & Mills, manufacturers of shapers at Cincinnati, O., will build a three-story brick and iron structure, to cost $10,000, for the accommodation of the increase in their business.

A new bridge is proposed across the Monongahela River, to connect Glassport and Mendelssohn. The principal promoters are said to be the Pittsburg, Virginia & Charleston Railroad and the United States Glass Co.

A feature of the new factory building for the Norton Emery Wheel Co., Worcester, Mass., is the mammoth kiln, just completed. In this kiln 60,000 brick were used. The outside diameter at the base is 25 feet, inside measuremont 18 feet and the extreme height 45 feet. The kiln has nine fire places and a total of 50 flues. The price list value of the goods that will be fired in the kiln at a single burning is $18,000. A new feature embodied in this kiln is an open space that completely encircles it and is similar in principle to that on a kerosene lamp. This circle secures, it is claimed, an even diffusion of heat. The contract for the foundation of the company's new factory has been awarded and already a portion of the walls is in position. Early August will probably see the new factory completed.



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Manufacturers of the
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General Industrial Notes:—

The mines of the Carnegie Steel Co., Ltd., at Scotia, Pa., have been closed down.

Greenville, Pa., business men are offering inducements to the H. A. Lozier Co. to build a tube mill at that place.

The Burden Iron Co.'s plant at Troy, N. Y., will suspend operations in the latter part of June for annual repairs.

The Cambria Iron Co. is making an extension to its mills, which will enable it to roll I beams up to and including 24 inches.

The Variety Iron Works, Cleveland, have just received the contract for another observation tower, to be located on the Gettysburg battlefield.

The application of the Garrison Foundry Co., of Pittsburg, for a receiver for the Baltimore Iron, Steel & Tin Plate Co., has been withdrawn, says a Baltimore dispatch.

The Edgar Thomson steel plant started up June 1, after a week's idleness. New equipment installed last week will permit of turning out rails and billets at the same time.

The Ohio Steel Co., Youngstown, O., which suspended operations three weeks ago, by reason of the blowing out of a cylinder head of its blooming-mill engine, resumed on Monday.

The Forsythe Pattern Works, Youngstown, O., shipped to Mt. Vernon, O., the largest pattern ever made in the Mahoning valley. The engine bed plate to be cast from it will weigh 35 tons.

A second order for a 400 h. p. Pittsburg feed water heater has been received by J. E. Schlieper, of Pittsburg, general sales agent for the Ohio Machine Co., from the La Belle Iron Works, Wheeling.

The appraisement of the Kelly Ax Works, at Alexandria, Ind., is $230,000. The liabilities are something over $100,000, including $50,000 bonds. It is expected the receivership will be dissolved in 60 days.

The new 15-gross-ton open-hearth steel furnace of the Franklin Steel Casting Co., of Franklin, Pa., is in active operation. The company also has two 10-ton furnaces. Steel castings only are produced.

The Davis & Egan Machine Tool Co., of Cincinnati, has just closed a contract with the Stoddard Mfg. Co., of Dayton, O., for its complete outfit of screw machines and hub machines for the manufacture of 100 bicycles a day. This is one of the largest orders given this season for bicycle machinery.

The Frank-Kneeland Machine Co., Pittsburg, has recently furnished a 34-inch reversing blooming mill, with tables, manipulator and ingot filter for the Apollo Iron & Steel Co., also a 16-inch weldless tube mill for the Kellogg Weldless Tube Co., Findlay, O. The company has under contract two monster roll lathes that will weigh about 50 tons each, one for the Carnegie Steel Co., and one for the Bethlehem Iron Co.

The Alcania Tin Plate Co., Youngstown, O., turned out its first product May 30. The chief product will be terne plate for roofing, spouting and gutters. The company has for its officers W. S. Collier, president; W. T. Lewis, vice president, of Pittsburg; T. H. Jeremiah, secretary and manager, and David Morris, treasurer, of Youngstown. The plant for the manufacture of tin and terne plates is located in the old Malleable Iron Works.

The Brown Car Wheel Works, Buffalo, N. Y., announce that the term of the co-partnership, "Rood & Brown Car Wheel Works," expired by limitation on May 19, and the Brown Car Wheel Works have acquired the plant and business and good will. The new firm assumes the liabilities and will continue the business. The announcement adds that the quality of its work will be the basis on which the new management will expect to retain the favor of the trade.

At the annual meeting of the Washburn & Moen Mfg. Co., held on May 26 at Worcester, Mass., the old board of directors were re-elected, as follows: President, William E. Rice; vice-president, treasurer and general manager, Philip W. Moen; directors, the above officers and George T. Dewey, Stephen Salisbury and Rockwood Hoar. It was voted to increase the capital stock from $3,500,000 to $4,000,000. A quarterly dividend of 2 per cent. will be declared.

A Birmingham, Ala., dispatch says: The coal companies have adopted a proposition made by the miners, of 40 cents per ton, minimum, based on iron at $2.50 per ton, and for every 50 cents advance, 2½ cents, until $10.50 is announced, after which 2½ cents on every dollar advance. The contract takes effect July 1, and is for one year instead of two years, as heretofore. The contract is exactly the same as that now in operation, except that the miners get an advance of 2½ cents, the basis last year being 37½ cents. All the miners and coal and iron operators in the district are bound by the new contract.

The new blowing engine, which has just been installed at the Sloss furnaces, Birmingham, by the Edward P. Allis Co., of Milwaukee, is a compound non-condensing engine of about 3,000 h. p., with a shaft 24 inches in diameter, and the whole weighs 300 tons. The shaft is 24 inches in diameter and is of wrought iron. The walking-beam weighs 25 tons, the bedplate 48 tons, and the shaft, with the crank, weighs 30 tons. The highest speed will be 35 revolutions of the fly-wheel, which is 24 feet in diameter, and is also of wrought iron. The cylinders and stroke are 44x68x60, and the air cylinders are 76 inches in diameter.

Car and locomotive building: The B. & O. gave 25 of the 75 new engines to the Richmond (Va.) Locomotive Works, 25 to the Baldwin Locomotive Works and 10 to the Cook Locomotive Works at Paterson, N. J. The 10 last named will be very heavy, for freight service. Each will weigh 80 tons empty. Of the 25 engines for the Lehigh Valley just let to the Baldwin Locomotive Works, 20 are to be 10-wheeled freight engines. The Southern Railway has recently given an order for 10 consolidation engines. Among recent car orders are 800 for the Illinois Central; 100 refrigerator cars for the P., W. & B.; 20 coaches for the New York and Brooklyn bridge, placed with the Pullman Co.

The operative exhibit of the J. H. McEwen Mfg. Co., installed at the electrical exposition in the Grand Central Palace, New York, in May, consisted of a 40 k. w. Thompson-Ryan multipolar generator, direct connected to a 10x10 Mc-

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Our large capacity, 8,000,000 annually, and modern plant, enable us to handle contracts of any size promptly.

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is an increasingly valuable medium through which to sell equipment to machine shops and foundries.

Ewen engine, and received its due share of attention from engineers and other visitors. Its compactness, pleasing outline and smooth running were matters of comment; to satisfy those interested from a practical standpoint, a water rheostat was provided so that any desired load up to 50% beyond the rated capacity of the dynamo could be thrown off and on at will. The normal capacity of the dynamo was 320 amperes at 125 volts, and the test of throwing on and off 450 to 475 amperes instantly with no sparking and without racing of the engine was a surprise to those who witnessed it. Catalogues describing the above equipment may be obtained by addressing the company at 18 Dey st., New York.

The introduction of General Electric Co. equipment into the operation of the Silver Lake Mines of E. G. Stoiber, at Silverton, Col., has resulted in economy so noticeable that an increase in the plant is now being made to provide for an extension of the system in the mines and to reinforce the water-power, which is not sufficient to furnish all the power required throughout the year. When completed, this will be the largest electric power plant in Colorado. Two cross compound Corliss engines, with cylinders 24″x46″x48″, each engine of 850 i. h. p. are now being set up, together with water-tube boilers, mechanical stokers, coal and ash conveyors, feed-water heaters, separators, water meter and coal weighers. The difference between the cost of coal at the power house and its cost at the mine which is at greater elevation by some 2,500 feet, is such that the saving effected, even when steam power is used for generating purposes, will insure an ample return on the investment, while the economy induced by the use of the water power is considerably greater. The adoption of electricity for the operation of his mines has greatly diminished the cost of working them. The plant now in operation consists of two 150 k. w. General Electric three-phase water-driven generators, supplying current to one 100 h. p. motor for the mill; one 100 h. p. motor for the air compressor; one 75 h. p. motor for the hoist; one 15 h. p. motor for the pump; one 1 h. p. motor for a blower and incandescent lights scattered throughout the station, mill and mine. The additional plant will consist of two 150 k. w. General Electric generators, one 100 h. p. motor for the mill; one 15 h. p. motor to drive a pump, and two 10 h. p. for blowers, forges and miscellaneous machinery. To utilize completely the capacity of the steam and water-power plants, additional and larger generators will eventually be set up.

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1—55″ Allen Riveter.
1—24x24x7 ft. New Haven Planer.
1—30x30x8 ft. Harrington Planer.
1—36x36x18 ft. Sellers Planer.
1—36x36x20 ft. N. Y. Steam Engine Co. Planer.
1—16x18″ Lathe & Morse Crank Planer.
2—15″ Hendey Shapers.
1—15″ Youngson Shaper.
1—15″ Smith and Mills Shaper.
1—10″x5′ Prentice Engine Lathe.
1 each 14″ and 15″x6′ Ames Engine Lathe.
1—16x5 ft. Bullard Engine Lathe.
1—18x8 ft. L. W. Pond Engine Lathe.
1—24x8 ft. Phillips Engine Lathe.
1—24x14 ft. Lathe & Morse Engine Lathe.
1—38x14 ft. New Haven Engine Lathe.

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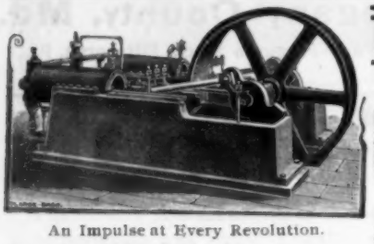

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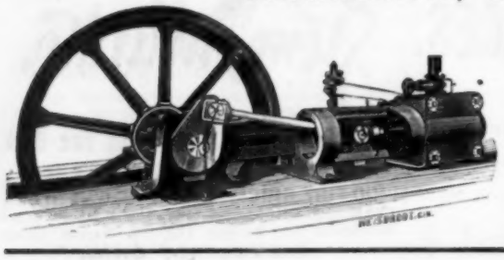

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THE cable car lines on Fifth and Penn avenues, Pittsburg, are being replaced by an electric system. One thousand new cars have been ordered and the new road will be in operation before fall. The majority of the motors will be of 50 h. p., although some more powerful ones will be used on street trains.

Prohibition National Convention Excursions to Pittsburg.

Excursion tickets to Pittsburg, account Prohibition National Convention, will be sold via Pennsylvania Lines May 24, 25 and 26; good returning until May 30. Particulars about rates and time of trains may be secured by addressing Pennsylvania Line ticket agents.

Pittsburg Saengerfest Excursions.

June 6, 7 and 8, are dates upon which excursion tickets to Pittsburg will be sold via Pennsylvania Lines for the North American Saengerfest. Return limit, June 13.

THE Cleveland Twist Drill Co. has been awarded the Edward Longstress medal of merit by the Franklin Institute of Philadelphia, for the Cleveland grip-socket, a device for holding and driving taper-shank twist drills, which is in extensive use.

Democratic National Convention Excursions to Chicago.

Tickets to Chicago will be sold at reduced rates via Pennsylvania Lines July 3, 4, 5 and 6; good returning until July 12; details may be obtained by applying to Ticket Agents of Pennsylvania Lines.

OFFICERS of the Amalgamated Association are trying to negotiate a settlement of the trouble at the Canton Steel Works, Canton, O., which started with the discharge of leaders in a movement to unionize the works.

Christian Endeavor Washington Excursions.

Low rate tickets to Washington account Christian Endeavor Convention will be sold via Pennsylvania Short Lines July 4,

5, 6 and 7; good to return until July 15, with privilege to extend limit until July 31. See Pennsylvania Line Ticket Agents for details.

IT is stated that the project of constructing a steel plant at Birmingham has been postponed by Tennessee Coal & Iron officials. About half the needed amount was pledged, but the balance, owing to monetary conditions, could not be secured on advantageous terms.

St. Louis Excursions for Republican National Convention

June 12, 13, 14 and 15, via Pennsylvania Lines; good returning until June 21. Rates and time of trains may be obtained of Pennsylvania Line Ticket Agents.

MANUFACTURERS of boiler iron and steel in plates, tubes, rivets, etc., find complaints of defective material growing less. This indicates improvement in manufacturing and a better knowledge on the part of boiler makers in the working of steel. The shops that turn out the best work have the least trouble. An occasional defect is inevitable in the works of the manufacturers and the shop of the boiler maker. The growing intelligence on the part of both is lessening this great annoyance to each.—[Boiler Maker.

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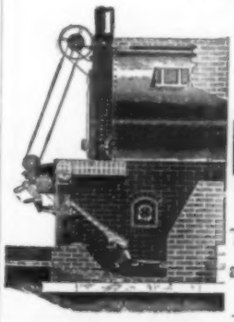

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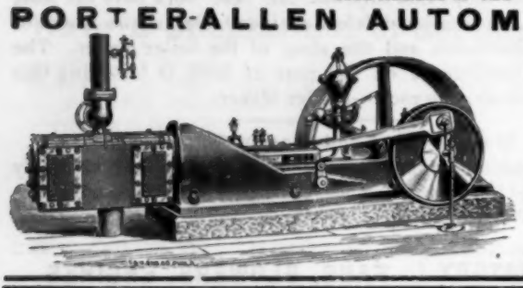

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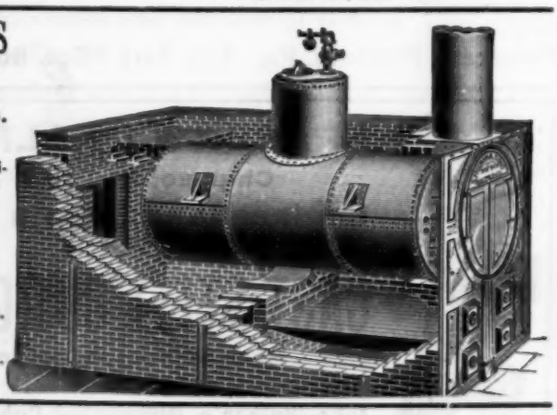

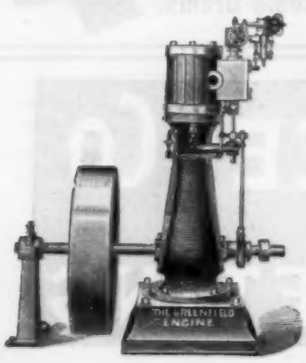

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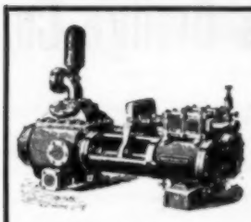

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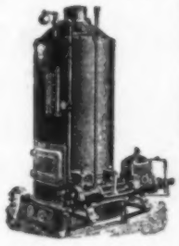

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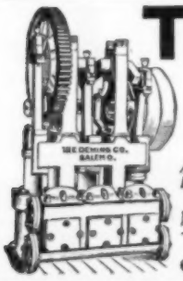

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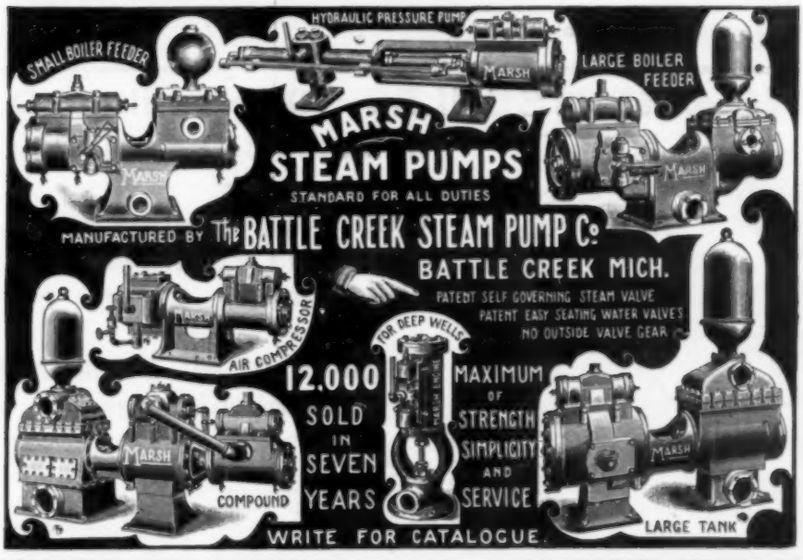

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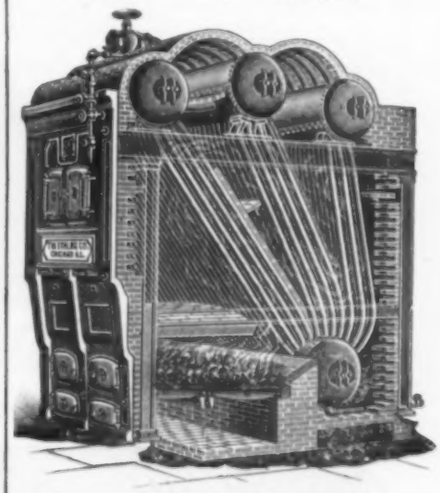

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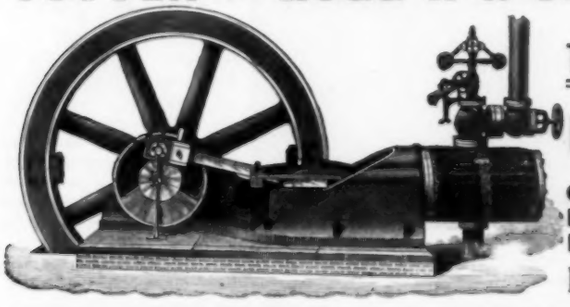

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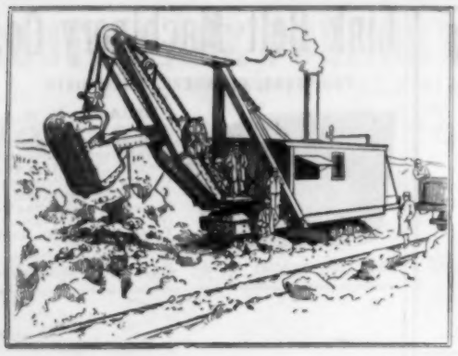

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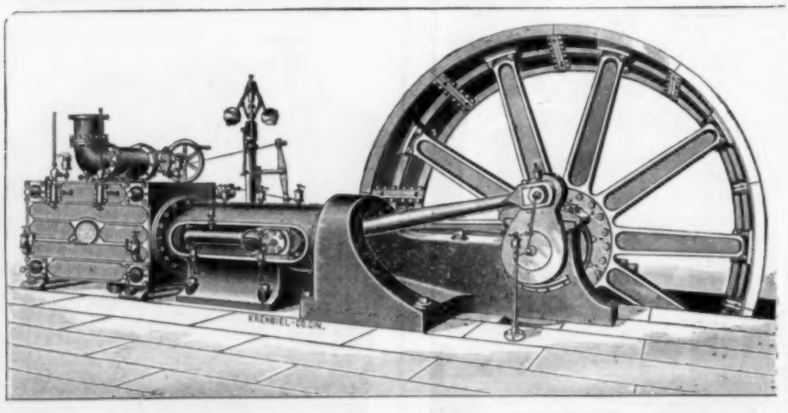

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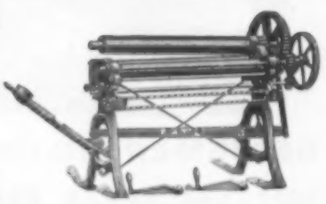

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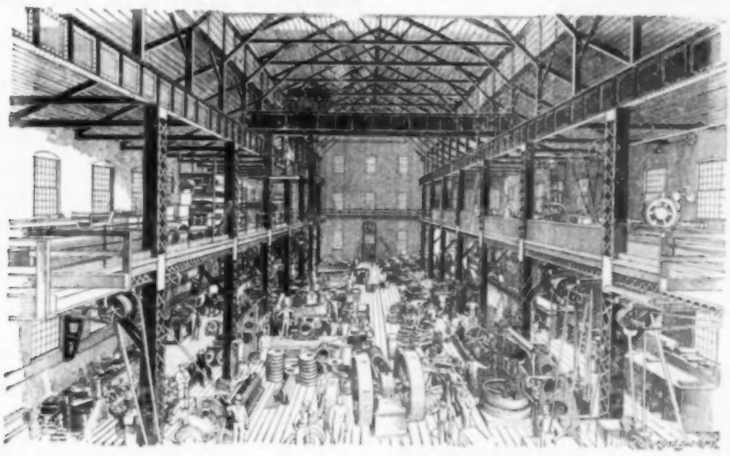

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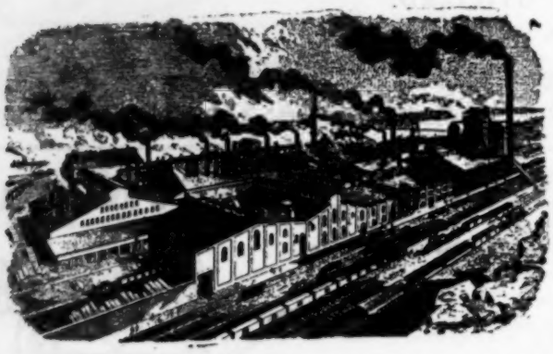

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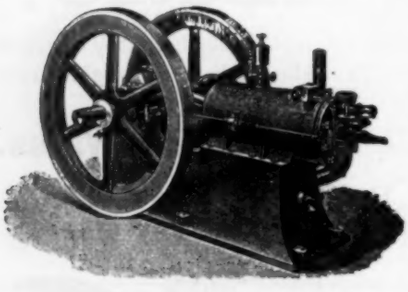

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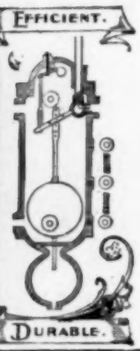

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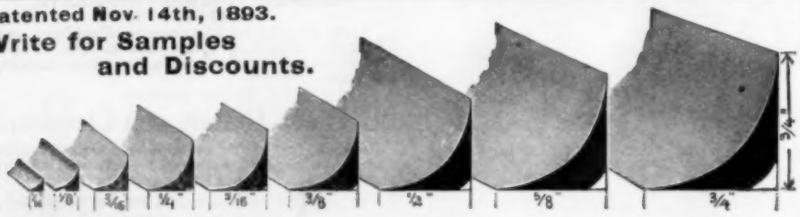

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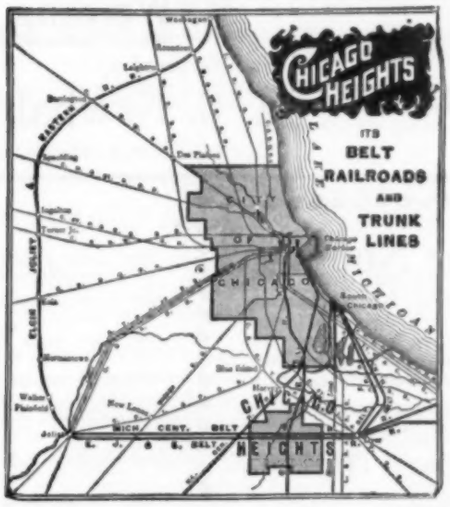

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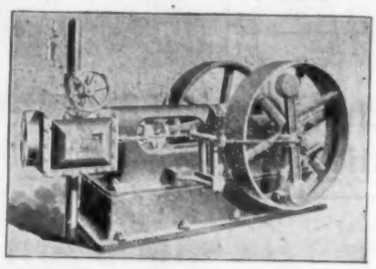

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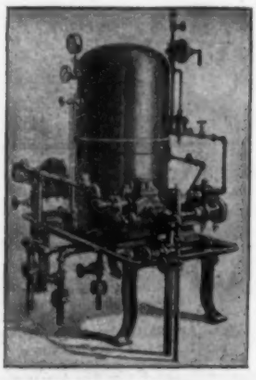

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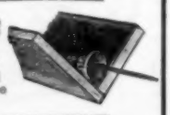

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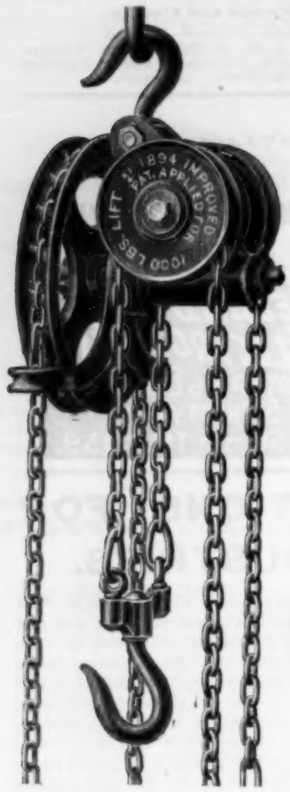

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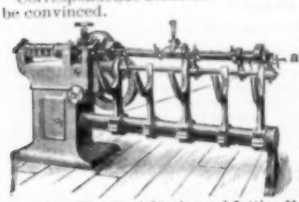

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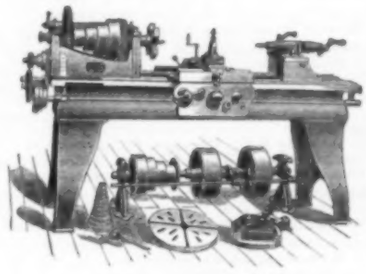

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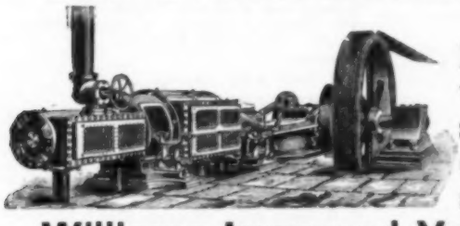

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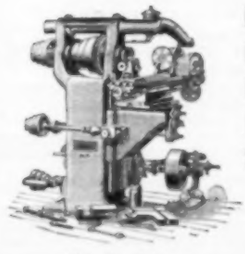

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NEW YORK, Room 1111 Havemeyer Bldg.
CHICAGO, Room 509, Home Ins. Bldg
MINNEAPOLIS, Room 416, Corn Exchange.
DENVER, 1316 18th Street.

SAN FRANCISCO, 31 Main Street.
PITTSBURG, 702 German National Bank Bldg.
SALT LAKE CITY, Desert Bank Bldg.
KANSAS CITY, Armour Bldg.

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IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	$4.50@ 4.75
No. 1 Bessemer hematite	4.00@ 4.25
Hematites No. 1 non-Bessemer	2.25@ 2.75
No 1. Specular, non-Bessemer	2.75@ 3.25

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$12 75@ 13 00
No. 1 Strong Foundry	12 50@ 13 00
No. 2 Strong Foundry	12 00@ 12 50
No. 1 Gray Forge, red short	11 00@ 11 25
No. 2 Gray Forge, neutral	10 75
No. 1 American Scotch	13 00
No. 2 American Scotch	12 50
Lake Superior Charcoal	13 50@ 14 00
PITTSBURG:	
No. 1 Foundry	$12 50@ 12 75
No. 2 Foundry	12 00@ 12 25
Gray Forge	10 75@ 11 00
White and Mottled	10 25
Warm Blast Charcoal	15 00@ 16 00
Cold Blast Charcoal	22 00
Bessemer	13 65@ 13 00
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$13 50@$14 00
Local Coke Foundry No. 1	12 00@ 12 50
Local Coke Foundry No. 2	11 50@ 12 00
Local Coke Foundry No. 3	11 00@ 11 50
Local Scotch Foundry No. 1	12 00@ 12 50
Local Scotch Foundry No. 2	11 50@ 12 00
Local Scotch Foundry No. 3	11 00@ 11 50
Southern Coke No. 1	12 10@ 12 35
Southern Coke No. 2	11 60@ 11 85
Southern Coke No. 3	11 10@ 11 60
Southern No. 1 Soft	11 60@ 11 85
Southern No. 2 Soft	11 35@ 11 50
Southern Silveries No. 1	11 85@ 12 35
Southern Silveries No. 2	11 60@ 11 85
Jackson Co. Silveries	14 50@ 16 00
Ohio Silveries No. 1	15 00@ 15 50
Ohio Silveries No. 2	14 50@ 15 00
Ohio Strong Softeners	15 00@ 15 50
Alabama Car Wheel	16 85@ 17 35
Malleable Bessemer	13 00@ 13 50
Coke Bessemer	13 00@ 13 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ $11 00
Southern Coke No. 2 and No. 1 Soft	10 50
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	13 00@ 14 00
Jackson County Silvery No 1	14 00@ 14 50
Southern Coke, Gray Forge	9 50
" " Mottled	9 50
Standard Alabama Car Wheel	15 00@ 16 00
Tennessee " "	14 00@ 15 00
Lake Superior " "	15 25@ 15 50
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$13 00@13 25
No. 2 Foundry Strong Coke Iron Lake Superior Ore	12 50@ 12 75
Ohio Strong Softener No. 1	13 00@ 13 50
Jackson Co. Silvery No. 1	15 25@ 15 50
Lake Superior Charcoal	13 50@ 14 00
Southern Soft No. 1	12 15
Hanging Rock Charcoal	17 00
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$ $11 50
Southern Coke No. 2	11 00
Southern Coke No. 3	10 50
Southern Gray Forge	10 00
Southern Charcoal No. 1	15 00
Missouri Charcoal No. 1	14 00@ 15 00
Ohio Softeners	16 00
Lake Superior Car Wheel	15 00
Southern Car Wheel	16 25

OLD RAILS AND SCRAP METAL.

	GROSS TONS
Old iron rails	$16 50
Old steel rails	12 50
Old car wheels	13 00
	NET TONS
No. 1 R. R. wrought scrap	$12 75
Mill scrap	10 00
No. 1 Machine cast scrap	10 00
Iron axles	17 50
Axle turnings	9 00
Wrought turnings (free from cast)	8 00
Cast borings	7 00
Uncut wrought iron boilers	4 00
Steel boiler plates	10 00
Grate bars	6 75
Pipes and flues (clean)	10 00
Tank iron	10 00
Hoop and band iron	7 00
Sheet iron	6 50
Wrought drillings	7 50
Malleable iron	10 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.64c
Angles	1.34c@1.39c
Tees	1.49c
Universal Plates	1.40c
Sheared Plates	1.45c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 30
4¼ to 6 by ⅜ to 1 inch	1 35
1¾ to 6 by 1⅛ to 2 inch	1 35
1¾ & 1⅜ by ⅜ to ¾ inch	1 20
1 & 1¼ by ⅜ to ¾ inch	1 20
⅛, ¼, ⅜, by ⅜ to ⅝ inch	1 20

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.

THE CADY MFG. CO.

18, 20 and 22 Johnson St., CLEVELAND, O.

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MILLING MINING AND AGRICULTURAL MACHINERY,

PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.

LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.

THE ROBERT AITCHISON. PERFORATED METAL CO.,

OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.

A. H. LEITCH, PREST. JOHN C. LEITCH, SEC. AND TREAS

WESTMORELAND FIRE BRICK CO. MANUFACTURERS OF HIGH GRADE FIRE BRICKS.

PITTSBURG, PA.

Works and Mines, Westmoreland, Pa.

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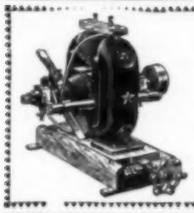
The most Marvelous Lubricant Known.
Used Dry, or Mixed with Water, Oil or Grease

NOT AFFECTED BY HEAT, COLD, STEAM OR ACIDS.

An Interesting and Instructive Pamphlet will be sent Free of Charge.

JOS. DIXON CRUCIBLE CO. Jersey City, N. J.



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For Incandescent Lighting,

In Factories, Mills, etc., at a Reasonable Price.

If you have power put in your own lighting plant. Write for our Catalogue.

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POWER From GAS OR GASOLINE.

No Steam, Coal, Ash, Gauges, Engineer nor Danger.

From 1 to 250 horse-power. } Can be Used in City or Country.

THE OTTO GAS ENGINE WORKS, Inc.

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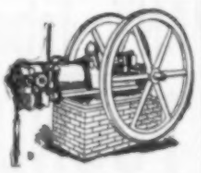

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.

CLEVELAND OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅜ inch	1 10
2 to 2¾ inch	1 30
2⅞ to 3¾ inch	1 25
3⅞ to 4 inch	1 60
4⅛ to 4⅝ inch	2 20
4¾ to 5 inch	2 40

Oval.

⅜ to 1¼ inch	1 30
⅜ to ¾ inch	1 30
½	1 50
⅝	1 70

Half Oval and Half Round.

1¼ to 3 inch	1 65
⅜ to 1¼ inch	1 45
⅜ to ¾ inch	1 70
½	1 85
⅝	2 90

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 20
1 to 1⅜ by ¼ and 5-16 inch	1 25
⅜ to ⅝ by ¼ and 5-16 inch	1 35
½ to ⅝ by ¼ and 5-16 inch	1 60

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 35
1 7-16 to 2, No. 17, 18 and 19	1 40
1 7-16 to 2, No. 20	1 50
1 7-16 to 2, No. 21	1 63
1 7-16 to 2, No. 22	1 70
1¼ to 1⅜, No. 13, 14 and 15	1 40
1¼ to 1⅜, No. 16, 17 and 18	1 45
1¼ to 1⅜, No 19 and 20	1 56
1¼ to 1⅜, No. 21	1 60
1¼ to 1⅜, No. 22	1 70
15-16 and 1 inch, No. 13, 14 and 15	1 35
15-16 and 1 inch, No. 16, 17 and 18	1 50
15-16 and 1 inch, No. 19 and 20	1 60
15-16 and 1 inch, No. 21	1 70
15-16 and 1 inch, No. 22	1 80
⅞, No. 13, 14 and 15	1 60
⅞, No. 16, 17 and 18	1 70
⅞, No. 19 and 20	1 80
⅞, No. 21	1 90
⅞, No. 22	2 00
13-16, No. 13, 14 and 15	1 70
13-16, No. 16, 17 and 18	1 80
13-16, No. 19 and 20	1 90
13-16, No. 21	2 00
13-16, No. 22	2 10
¾, No. 13, 14 and 15	1 80
¾, No. 16, 17 and 18	1 95
¾, No. 19 and 20	2 05
¾, No. 21	2 15
¾, No. 22	2 25
11-16, No. 13, 14 and 15	2 05
11-16, No. 16, 17 and 18	2 10
11-16, No. 19 and 20	2 20
11-16, No. 21	2 30
11-16, No. 22	2 40
11-16, No. 23	2 50
⅝, No. 13, and 15	2 10
⅝, No. 16, 17 and 18	2 20
⅝, No. 19 and 20	2 30
⅝, No. 21	2 40
⅝, No. 22	2 50
⅝, No. 23	2 60
9-16, No. 13, 14 and 15	2 30
9-16, No. 16, 17 and 18	2 40
9-16, No. and 20	3 50
9-16, No. and	1 60
9-16, No. 221	2 70
9-16, No. 23	1 80
7-16 ad ½ inch, No. 13, 14 and 15	3 50
7-16 and ½ inch, No. 16, 17 and 18	2 60
7-16 and ½ inch, No. 19 and 20	2 70
7-16 and ½ inch, No. 21	2 80
7-16 and ½ inch, No. 22	2 90
7-16 and ½ inch, No. 23	3 00
⅜, No. 13, 14 and 15	3 00
⅜, No. 16, 17 and 18	3 10
⅜, No. 19 and 20	3 20
⅜, No. 21	4 50
⅜, No. 22	3 60
⅜, No. 23	3 75

Light Band.

1⅜ to 6 by ⅛ to 3-16 inch	1 60
1⅜ to 6 by Nos. 11 and 12	1 65
1 to 1⅜ by ⅛ to 3-16 inch	1 65
1 to 1⅜ by Nos. 11 and 12	1
⅜ and 13-16 by ⅛ to 3-16 inch	1
⅜ and 13-16 by Nos. 11 and 12	1 75
½ and 11-16 by ⅛ to 3-16 inch	1 90
½ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ⅛ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
⅛ by ⅜ to 3-16 inch	2 20
¼ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	1 50
⅜ inch, " " " " 13 and 14	1 60
½ inch, " " " " 11 and 12	1 65
¾ inch, " " " " 13 and 14	1 75

Sheet Iron.

No. 10	1 45
No. 12	1 55
No. 14	1 65
No. 15-17	1 75
No. 18	1 90
No. 20	2 15
No. 22-24	2 15
No. 25 26	2 25
No. 27	2 35

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 45
Shell	1 60
Flange	1 70
Marine Flange	2 00
Fire Box	2 50

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. ℔. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08

Soft Steel Bars, Light

LOW PRICES

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Write us for our catalogue and send us a sample order and see if there is not **Economy** in using **First Quality** goods at Fair Prices.

Structural Shapes, Rails.

TIN PLATES,
GALVANIZED SHEETS,
CORRUGATED IRON,
BLACK PLATES,

Sheet Iron and Steel, any finish, patent leveled or common.

Aetna Standard Iron & Steel Co.,
BRIDGEPORT, OHIO.

ROBERTS STEEL CHAIN BELTING CO., Pittsburg, Pa.

Elevating and Conveying Machinery

For Handling all kinds of materials.

Special Wrought and Steel Chains of every description ; Coil and Cable Chains ; Chain Haulages for Coal Mines ; Sprocket Wheels ; Complete Coal and Ashes Handling Plants ; Wire Rope Haulages and Wire Rope.

W. H. COFFMAN COKE CO.

BLUEFIELD, W. VA.

GENERAL FACTORS AND SHIPPERS OF

POCAHONTAS FLAT-TOP COKE.

So low in ash that it requires no fluxing for foundry purposes. Our foundry and furnace coke was awarded the first premium at the World's Fair in 1893.

AVERAGE ANALYSIS OF COKE.

Moisture	00.196	Sulphur	00.677
Fixed Carbon	93.625	Ash	05.004
Volatile Matter	00.494		

Foundry, Furnace and all sizes of crushed coke. Guaranteed lower in Sulphur than any other commercial coke

STEEL CASTINGS

FROM 10 LBS. UPWARD.

Made from Best Open-Hearth Steel.

ALSO SAND ROLLS AND CAST-IRON PINIONS.

SEND FOR ESTIMATES.

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GARDEN CITY FOUNDRY CO.

INCORPORATED.

Successors to TURNER, DICKINSON & CO.

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FRICTION CLUTCHES, HANGERS, PILLOW BLOCKS & PULLEYS.

Large Stocks on Hand. Shipments Promptly Made.

..'96 JENKINS '96..

Is the Perfection of Joint Packing. Instantaneous. Does not Squeeze Out and not Necessary to follow up Joint. We guarantee it to last for years on any and all pressures of steam or any kind of joint where packing is required. **Does not Rot, Burn or Blow Out,** therefore the best for all purposes. Call for and insist on having **'96 JENKINS '96** stamped like cut.

Jenkins Bros., New York, Boston, Philadelphia Chicago.

7-16 to ⅜ and 2⅜ to 3 in.	.09
3⅜ to 4 in.	.09½
⅞ to 11-16 and 4⅜	.10
⅞ to 6 in.	.10½
¼ to 9-32 and 6⅜ to 7 in.	.11
1 ⅛ in	.13

Flats.

	cts. lbs
2 to 9-16 in. wide by 2 to ⅜ thick	.8

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 50
Open-hearth Tire	"	1 80
Open-hearth Spring	"	2 20
Sleigh Shoe	"	1 90
Toe Calk	"	2 10
Cutter Shoes, tapered and bent	"	2 20

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	3 30
Bridge ⅛, ⅜, 11-16 and ½ inch diam	3 00

Wrought Pipe and Boiler Tubes.

Lap weld black, base	dis. 65
Butt " " "	dis.
Lap " galv. "	dis. 52½
Butt " " "	dis. 50
Boiler tubes 2½" and smaller	dis 62½
Boiler tubes 2½" and larger	dis. 65
Casing screw and socket joint	dis. 52½
Casing inserted joint	dis. 47½

MACHINERY SUPPLY MARKET.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis
Horton's Universal	dis
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis
" " Gear Cutters	dis

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1⅛"	dis 50&10
Morse Taper and Straight Shank Larger than 1⅛"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

SHIFFLER BRIDGE COMPANY,

BUILDING DEPARTMENT.

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Stub's ..... dis 25
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Atha new list, Jan. 15, 1887 ..... dis 50
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Illinois Bolt Co. list ..... dis 75

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List July 14, 1887 ..... dis 85
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Iron Pulleys, Walker List ..... dis 50
Medart Pulleys ..... dis 50
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Moore's Anti-Friction Differential Chain Pulley Block ..... dis 20

Rivets.

Iron, Thousand, list November 1, 1894 ..... dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894 ..... dis 60@65
Copper ..... dis 50@50&10

Taps.

Cards, Hand and Nut to 2 in ..... is 50
Carpenters' " " " ..... dis 50
Morse " " " ..... dis 50
Pratt & Whitney " " new list ..... dis 10
Machine Screw Taps ..... dis 55
Pipe Taps to 2½ in ..... dis 70
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Pulley Taps ..... dis 40

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Prentiss ..... dis 20
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Miller's Falls ..... dis 40
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Howard ..... dis 35

Wire.

New List, Apr. 9, 1894

Brass ..... dis 4f
Copper ..... dis 4c
Bright and annealed, Nos. 0@18 ..... dis 70&10&75
" " Nos. 19@26 ..... dis 75@75&5
" " Nos. 27@36 ..... dis 75&10&5
Coppered Nos. 0 to 18, market list ..... dis 70@70&5
Galvanized Nos. 0 to 18 " " ..... dis65&5
Tinned market Nos. 0 to 18 ..... dis 67½
Cast steel ..... dis 50
Tinned Broom Wire ..... dis 70&5@70&10
annealed Fence, Nos. 8 and 9 ..... dis 75
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Stub's Steel Wire regular ..... 95c ℔ lb dis 30

Wrenches.

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Mechanic's ..... dis 55&10&5
Bemis & Call's Combination ..... dis 35
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Lamson & Sessions Engineers ..... dis 65
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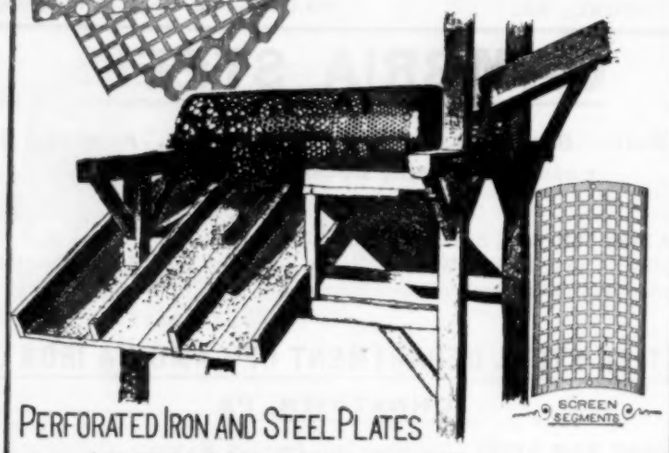

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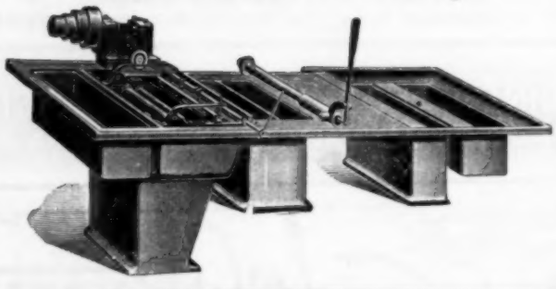

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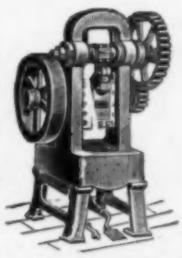

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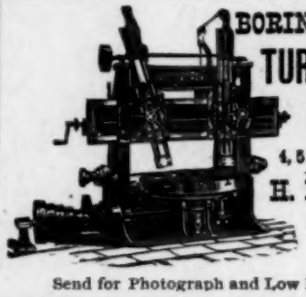

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